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CANMET

Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

INDEX OF MINING TECHNOLOGY PROJECTS

RÉPERTOIRE DE PROJETS EN TECHNOLOGIE MINIÈRE

1988

MINING RESEARCH LABORATORIES

LABORATOIRES DE RECHERCHE MINIÈRE

737 AP

Canada

INDEX OF MINING TECHNOLOGY PROJECTS

RÉPERTOIRE DE PROJETS EN TECHNOLOGIE MINIÈRE

1988

R.T. Blake, N. Billette & R. Boyle

Mining Methods
and Evaluation Group

Groupe d'évaluation
et de méthodes minières

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FOREWORD

In the mid-1980s, at the request of the National Advisory Committee on Mining and Metallurgical Research, CANMET's Mining Research Laboratories (MRL) established a database of information on mining technology projects being undertaken in Canada.

The annually produced Index of Mining Technology Projects, which is a hard copy version of the current projects section of the database, was first published in 1985.

This 1988 Index is the fourth editon and, as in previous years, contains information on research and development projects currently being carried out by mining companies, universities, federal and provincial agencies, and private sector organizations. Contributors are contacted annually to update information and, at the same time, all sectors of the minerals industry are canvassed for new contributors to the Index.

Section 1 of the Index lists projects by organization, whereas Section 2 lists projects by subject category. This format appears to be satisfactory as CANMET has been complimented on both the usefulness of the Index and the way in which it presents and classifies information that is not normally available in a published form.

We ask that the Index be circulated more widely amongst technical personnel in companies and R&D establishments, since we believe that there are some potential users who still do not benefit from this source of information.

The usefulness of the Index depends entirely on the participation of the mining community. We trust that the inclination of companies to share technical information, as indicated by the growth of the Index in the past four years, will continue in the future, and that this participation will contribute to productivity increases and greater international competitiveness for the Canadian mining industry.

Finally, I would like to thank all those who contributed to the 1988 version of the Index and ask for their continued support, as well as the input of new contributors, in the preparation of the 1989 Index.

John E. Udd
Director
Mining Research Laboratories

AVANT-PROPOS

A la demande du Comité aviseur national en recherche minière et métallurgique, les Laboratoires de recherche minière de CANMET ont établi, au milieu de la présente décennie, une banque d'information sur les projets en technologie minière initiés au Canada.

Le Répertoire de projets en technologie minière fut imprimé pour la première fois en 1985, puis annuellement depuis, à partir de la version la plus à jour dans la banque de données.

Le Répertoire 1988 constitue donc la quatrième édition et, tout comme les versions antérieures, contient l'information concernant les projets de recherche et développement présentement en cours dans les sociétés minières, universités, institutions fédérales et provinciales, organismes du secteur privé. Une remise à jour du Répertoire est réalisée annuellement, en contactant les participants passés ou potentiels de tous les secteurs de l'industrie minière.

La partie 1 du Répertoire regroupe les projets par organisation, tandis que la partie 2 les catégorise par sujets. Ce format semble satisfaisant, puisque CANMET a été félicité tant pour l'utilité du Répertoire que pour la façon dont il présente et classifie l'information, format habituellement non disponible dans une publication.

Par ailleurs, nous voudrions que le Répertoire circule plus librement parmi le personnel technique des sociétés et entreprises de R&D, étant donné notre conviction que certains usagers potentiels n'y bénéficient pas encore de cette source d'information.

L'utilité du Répertoire dépend entièrement de la participation active de la communauté minière. Nous avons bon espoir que le désir de partager l'information technique, démontré par la croissance du Répertoire depuis quatre ans, continuera à se manifester à l'avenir et que de cette participation découlent des augmentations de productivité et une compétivité internationale accrue de l'industrie minière canadienne.

Enfin, je désire remercier tous ceux qui ont contribué à la version 1988 du Répertoire, et solliciter un soutien continu de leur part, de même que l'apport de nouveaux participants, lors de la préparation du Répertoire 1989.

John E. Udd

John E. Udd
Directeur
Laboratoires de recherche minière

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INTRODUCTION

The majority of Canadian mines are located away from urban centres, and therefore mine operators do not always have ready access to sources of technical information, such as libraries, universities, government agencies and professional associations.

As a result, many operators find it difficult to keep up-to-date with advances in technology, new equipment, and operating procedures, and often find themselves "reinventing the wheel". This is a needless expense for any operator, particularly at a time when national and international competition is becoming more fierce and production costs are rising rapidly. Such duplication of effort is obviously unhealthy for an operator's balance sheet and also the national economy.

This problem was recognized by both Industry and Government the mid-1980s and because CANMET had always been nonpartisan and its relationship with the industry at large almost always cordial, the Mining Research Laboratories (MRL) division of CANMET was asked by the National Advisory Committee on Mining and Metallurgical Research to establish an information system that would facilitate communications between operators and other segments of the industry on technology development projects.

Dr. Udd's foreword gives a brief explanation of the origin of the database and the format for the hard copy Index.

Although readers of previous editions were asked for suggestions on how to improve project categorization, very few responded; hence the invitation is once again extended to readers. At present there are 12 categories in the Index but, because of the difficulty in grouping the many facets of mining technology into just 12 groups, four new categories will be introduced for the 1989 Index.

This latest Index has been compiled using information gathered during the spring and summer of 1988, by way of telephone conversations, mine visits and correspondence. Although the Index contains information only on mining projects currently being undertaken by industry, the data on projects that have been completed, postponed or abandoned are preserved in the database.

The majority of mine operators who were contacted had projects on the go; however, some were without identifiable projects, and just a few obviously still remain to be convinced of the benefits to sharing this type of information. The variety and manner of the responses raise the questions: "What is research?" and "How does research differ from those operational improvements all mines strive for on a daily, monthly or annual basis?" These questions have not been resolved and so, for the purpose of this Index, all research projects submitted have been included, except certain ones pertaining to mineral processing.

For information on mineral processing, readers may consult a recently published CANMET report entitled Index of Mineral Processing Projects, which is available from CANMET PUBLICATIONS [tel: (613) 992-6793] as CANMET report SP 88-2.

Without question, the management and staff at the majority of mining properties see the advantages of changing one or more aspects of their operations, such as switching from selective mining methods to bulk mining methods to improve productivity and lower the costs per unit mined. Advantages of technical change may also include improved health and safety, better environmental controls, and enhanced methods for resource conservation, to name but a few.

Whatever the circumstances, most operators are trying to incorporate new concepts into their mine operations. Unfortunately, although similar, no two operations are exactly alike and therefore ideas implemented in one mine often cannot be used in another without some modification. As a result, nearly every operator must undertake some original thinking on such matters. However, we believe that a publication such as the Index can facilitate this process with its listing of technically related projects, which cannot otherwise be found in technical publications or databases.

It should be noted that CANMET does not possess detailed information on projects contained in the Index. For additional information, readers should contact the person listed on the appropriate page in Section 1.

INTRODUCTION

La plupart des mines canadiennes sont situées loin des centres urbains. Le personnel minier n'a donc pas toujours accès aux sources d'information technologique, telles que librairies, universités, agences gouvernementales et associations professionnelles.

Par conséquent, plusieurs exploitants ont de la difficulté à suivre les progrès en technologie, matériel et procédés industriels, ce qui les oblige à réinventer la roue. Ceci constitue une dépense inutile, tout particulièrement lorsque la compétition nationale et internationale s'intensifie et que lescoûts d'opération augmentent rapidement. Ces duplications d'efforts ont un impact négatif non seulement sur la situation financière de l'exploitant, mais également sur l'économie nationale.

Tant l'industrie que le gouvernement central ont réalisé, au début des années 1980, l'impact d'une telle situation. Puisque CANMET a toujours agi de façon non partisane et maintenu des liens généralement cordiaux avec l'ensemble de l'industrie, le comité national aviseur en recherche minière et métallurgique a alors demandé aux Laboratoires de recherche minière de CANMET d'établir un sytème d'information qui faciliterait les communications sur les projets de développement technologique entre les exploitants et les autres secteurs de l'industrie.

L'avant-propos du docteur Udd explique brièvement l'origine de la banque de données et le format de la version écrite du Répertoire.

Bien que les lecteurs des éditions antérieures aient été invités à commenter la division des catégories du Répertoire, très peu l'ont fait à date, d'où la nécessité de réitérer ici l'invitation. La dificulté de regrouper les nombreuses facettes de la technologie minière dans les 12 catégories actuelles du Répertoire entraînera la création d'au moins quatre catégories additionnelles dans le Répertoire 1989.

Le présent Répertoire a été produit à partir d'information recueillies au cours du printemps et de l'été 1988, à partir de conversations téléphoniques, de visites aux mines et de correspondance. Bien que le Répertoire ne contienne que l'information concernant les projets en cours au Canada, les données liées aux projets complétés, reportés ou abandonnés sont conservées dans la banque.

La plupart des exploitants miniers sollicités avaient des projets en marche, certaines entreprises n'en ayant pas à ce moment et seuls quelques uns ne sont toutefois toujours pas convaincus du bien-fondé du Répertoire et du partage d'informations. La variété des réponses et la manière de le faire soulèvent aussi la question: "qu'est-ce que la recherche et comment diffère-t-elle des améliorations opérationnelles réalisées à toutes les mines sur une base quotidienne, mensuelle ou annuelle?" Cette question demeure en suspens et, dans le Répertoire, tous les projets de recherche soumis ont été inclus, sauf ceux ayant trait à la minéralurgie.

L'information concernant la minéralurgie peut être obtenue dans un rapport récent de CANMET intitulé "Répertoire de projets en minéralurgie", disponible auprès des publications de CANMET, rapport CANMET SP88-2 [tél.: (613) 992-6793].

Il va de soi que la direction et le personnel cadre de la plupart des exploitations minières reconnaissent les avantages de modifier l'un ou l'autre de leurs opérations, par exemple le transfert de méthodes sélectives d'exploitation à des méthodes en vrac, afin d'obtenir plus de productivité et un coût unitaire plus faible. Parmi les avantages des changements technologiques, il faut aussi inclure les conditions améliorées de salubrité et sécurité, de meilleurs contrôles environnementaux et une conservation accrue des ressources, pour n'en nommer que quelques uns.

Quelles que soient les circonstances, la plupart des exploitants tentent d'intégrer de nouveaux concepts à leurs opérations. Malheureusement, bien que similaires, il n'existe pas deux exploitations identiques, ce qui oblige à modifier à chaque fois les idées d'implantation, heureuse chez un voisin. Chacun doit donc réfléchir à la façon d'implanter des idées originales dans sa propre entreprise. Nous croyons toutefois qu'une publication comme le Répertoire facilite ce processus en énumérant des projets techniquement semblables, autrement introuvables dans des publications ou banques de données.

On ne peut passer sous silence le fait que CANMET ne possède pas d'informations détaillées pour la plupart des projets contenus dans le Répertoire. Pour obtenir plus d'informations spécifiques, le lecteur doit s'addresser à la personne nommée à la page appropriée de la Section 1.

SECTION 1

Projects Listed by Organization

Liste des projets par organisation

Afton Operating Corporation,
P.O. Box 937,
KAMLOOPS, BC,
V2C 5N4

George Thornton,
Chief Engineer,
(604) 374-5022

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. DM/Crescent zone mine feasibility studies	2

Blackdome Mining Corporation,
P.O. Box 549,
CLINTON, BC,
V0K 1K0

Peter Busse,
Mine Manager,
(604) 684-6031

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design of 20 tph. surface mine backfill plant.	8

Brenda Mines Ltd.,
Brenda Mine,
P.O.Box 420,
PEACHLAND, BC,
V0H 1X0

Kerry M. Smith,
Senior Mine Engineer,
(604) 763-3220

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Geostatistical ore reserve modelling for diamond drill and blast hole drill assays with computer graphic and plotter displays.	3
2. Update interactive short to long range planning system for use on IBM-PC/AT work station.	4 , 11
3. Reclamation work on tailings dam and waste dumps, including re-sloping and seeding.	3
4. Computerized surveying system for EDM using Autocad to update mine plan and store survey pick-ups.	4 , 11
5. Computer assisted economic pit limit determination	4 , 11

Derek Perkins, Chief Chemist.

1. Evaluation of the effects of water flowing through surface waste rock dumps/piles.	3

Byron Creek Collieries,
Coal Mountain Operations,
P.O. Box 1960,
SPARWOOD, BC,
V0B 2G0

Arquimides Perez,
Mine Engineer,
(403) 562-2837

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Restoration of coal refuse/waste storage sites.	3
2. Waste handling by conveyors as an alternative for traditional truck haulage; detailed engineering study in progress.	8

Cominco Limited,
Polaris Mine,
Little Cornwallis Island,
POLARIS, NT,
X0A 0Y0

C.N. Zahovskis,
Mine Superintendent,
(819) 253-2231

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Pillar mining at the Polaris mine using frozen backfill. Ongoing search for ways to ensure steady supply of good quality backfill material.	7 . 10
2. Cable bolting techniques in permafrost ground conditions, in production phase operations.	10

Cominco Limited,
Sullivan Mine,
P.O. Box 2000,
KIMBERLEY, BC,
V1A 2G3

R.M. Henningson,
General Manager,
Kimberley Operations,
(604) 427-2271

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing research on explosives and explosives technology.	7
2. Continuation of study to develop better mechanised mining methods for use in low dipping (20 to 40 degs.) pillar recovery mining operations.	4, 7
3. Initial study on the introduction of bioleaching methods for the recovery of zinc from remnant pillars and broken ore in the Sullivan mine.	7, 12
4. Development of the use of remote sensing imagery to monitor surface caving and subsidence activity.	10, 11
5. Blast monitoring program.	7, 11
6. Continuing the program to control underground diesel emissions by the gradual introduction of ceramic filters on all dieselized equipment.	5, 9
7. Development of mine-wide computer database system.	1
8. Shotcrete cable bolts and applications	10

Fording Coal Limited,
P.O. Box 100,
ELKFORD, BC,
V0B 1H0

D.A. Brown,
Mining Superintendent,
(604) 865-2271

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Short range planning model.	11 , 4
2. Demonstration and evaluation of blast casting in a producing Canadian surface coal mine.	7
3. Evaluation of various methods of resloping large coal mine waste dumps to allow for final revegetation.	3
4. The long-term use of flow-through rock drains in coal mine waste dumps.	3
5. Optimization of raw coal recovery and quality, including reconciliation of past performance	3 , 8
6. Evaluation of haulroad dust control and dust abatement alternatives.	3 , 1

R.A.H. Blackstock, Mech/Elect. Division.
Tel: (604) 865-4444

1. Electronic field shunting on 120 ton Wabco haultrucks to improve performance.	5

Giant Yellowknife Mines Ltd.,
Giant Mine,
P.O. Bag 3000,
YELLOWKNIFE, NT,
X1A 2M2

S.E. El-Alfy, P.Eng.,
Chief Engineer,
(403) 873-6301

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Hydraulic reclamation of 200 tpd of frozen tailings for the recovery of gold by the carbon-in-leach (CIL) process.	7 , 12

Highland Valley Copper,
P.O. Box 1500,
LOGAN LAKE, BC,
V0K 1W0

W.K. Munro,
Chief Mine Engineer,
(604) 575-2443

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Shovel payload weighing system.	5 , 11
2. Computer assisted truck dispatch.	8 , 11

D.G. Carson, Reclamation & Project Superintendent.
Tel:(604) 575-2443

1. Complete relocation of Highmont mill complex along 9 km of mine roads using heavy diesel equipment. Major logistics project.	3 , 8

Nanisivik Mines Ltd.,
P.O.Box 225,
NANISIVIK, NT,
X0A 0X0

W.H. McNeill,
Mine Superintendent,
(819) 436-7376

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing development of mining techniques in ice and permafrost.	4
2. Removal of high (over 20 m) post-pillars from an existing open room and pillar stoping area (equipment and ground control considerations).	3

Westar Mining Ltd.,
Greenhills Operations,
P.O. Box 4000,
ELKFORD, BC,
V0B 1H0

Don Parsons,
Project Engineer,
(604) 865-4621

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1.	Rotary breaker for reject crushing and feeding to the preparation plant for coal processing.	2, 12
2.	Ground stability of a moderately dipping coal seam footwall.	10
3.	Use of a conveyor system to transport raw coal from the pit areas to the breaker (crushing) station.	5, 8
4.	Interactive short and long term open pit computer mine planning system using micro-computers, and including production monitoring and control systems (PCMS) for input.	4
5.	Processing plant yield improvement projects.	12
6.	The implementation of a production monitoring and control system (PMCS) for pit operations.	7, 11
7.	Large scale backhoe applications in multi-seam mining operations.	5, 7
8.	Automated floculation stations located on water courses draining off the mine property.	3

Westmin Resources Limited,
Myra Falls Operations,
P.O. Box 8000,
CAMPBELL RIVER, BC,
V9W 5E2

P.R. Schultz,
Asst. Manager/Chief Engineer,
(604) 287-9271

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
A. Chance, Geotechnical Engineer. Tel: (604) 287-9271	
1. The influence of rock mechanics considerations on mine design and short and long term stability.	4 , 10
R. Van Dyk, Environmental Engineer. Tel: (604) 287-9271	
1. Sub-aerial tailings deposition.	3 , 5
2. Cementation of waste rock to effect control of acid mine drainage.	3
D. Botsford, Senior Mining Engineer. Tel: (604) 287-9271	
1. Prevention of secondary sulphide dust ignitions/explosions.	9

Central Canada Potash,
Noranda Minerals Inc.,
P.O. Box 1500,
COLONSAY, SK,
S0K 0Z0

Dr. A.M. Coode,
Chief Mine Engineer,
(306) 944-2170

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. A field test program to evaluate the use of waste salt backfill in Saskatchewan potash mines.	10
2. A computer system to predict subsidence related to potash mining for use on IBM AT's.	10 , 11
3. Tri-axial creep test of Saskatchewan potash mine sylvite.	10
4. Basic research into the control of brines around underground bulkheads in Saskatchewan potash mines.	10
5. Assessment of the longevity of grouts used underground in Saskatchewan potash mines.	10

W.C.H. Kruining, Technical Services Supervisor.
Tel: (306) 944-2170

1. Recirculation of exhaust air in potash mines.	9

Cigar Lake Mining Corporation, 410-224 Fourth Avenue S., SASKATOON, SK, S7K 5M5	G.A. Peebles, General Manager, (306) 665-2628

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Underground testing of a mining method for a very high grade uranium deposit.	4

Echo Bay Mines Ltd.,
3300 Manulife Place,
10180 - 101 Street,
EDMONTON, AB,
T5J 3S4

W.R. Gilroy,
Manager, Mine Engineering,
(403) 429-5811

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Longhole mining of narrow ore bodies with small, mechanised equipment.	4 , 7

Hudson Bay Mining and Smelting Co. Ltd.
Ruttan Division,
P.O. Box 103,
LEAF RAPIDS, MB,
R0B 1W0

M. Kirby,
General Manager.
(204) 473-2415

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Communication system for isolated areas in underground mines.	1 , 9
2. Ground stability evaluation with particular reference to an en-echelon lensed ore body.	4 , 10

Hudson Bay Mining and Smelting Co. Ltd.,
Snow Lake Operations,
P.O. Box 1500,
FLIN FLON, MB,
R8A 1N9

Brig Sigismund,
Chief Mine Engineer,
(204) 687-2396

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Bacterial-Leach assisted mining.	4 , 12
2. Mine design CADD system.	4 , 11

Inco Limited,
Manitoba Division,
THOMPSON, MB,
R8N 1P3

W.R. Niemi,
Supt. Mines Research,
(204) 677-5211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Sound and vibration suppression on compressed air equipment (jack-legs and stopers).	5 , 9
2. Development of 4 in. butterfly valve for use with sandfill material.	5
3. Pneumatic barricade bags for use in drawpoints.	5 , 10
4. Polyurethane applications for material and equipment in the underground environment.	5
5. Development of a geomechanical database and numerical model for predicting ground behaviour at depth. (CAN/MAN. MDA)	4 , 10
6. Vertical Blasthole Mining (VBM) design guidelines for steeply dipping ore bodies, hang-up removal and scaling techniques. (CAN/MAN. MDA)	4 , 10
7. Optimization of blast design for blasthole mining operations. (CAN/MAN. MDA)	4 , 7
8. Evaluation of non-destructive testing devices for mine shaft ropes. (CAN/MAN. MDA).	5

International Minerals
and Chemical Corporation (Canada) Ltd.,
Potash Division,
ESTERHAZY, SK,
S0A 0X0

Jan Beno,
Manager, Metallurgy and Development,
(306) 745-3931

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Study of overburden movement and pillar behaviour in extracted areas.	10
2. Seismic monitoring.	10
3. Input parameters for numerical modelling of potash strata	10, 4
4. Pulse E.M. for identification of conductive anomalies near potash mine workings.	10

Luscar Ltd.,
1600 Oxford Tower,
10235-101 Street,
EDMONTON, AB,
T5J 3G1

R.W. Forbes,
Vice-President Mining,
(403) 420-5810

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Testing density probe for improving removal of waste from raw coal product during loading operation with continuous surface miner.	8 , 11

LynnGold Resources Inc., LYNN LAKE, MB, R0B 0W0	D. Tenney, Chief Mine Geologist, (204) 356-2401

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Investigation of reduced cable support of HW of open stopes at MacLellan Mine (cut and fill mining).	10
2. Development of interactive computerized core logging system for rock mechanics applications - ROCKLOG.	3, 4

Potash Corporation of Saskatchewan,
Earth Sciences Mining Division,
PCS Tower,
Suite 500, 1st. Avenue South,
SASKATOON, SK,
S7K 7G3

James L. Lewis,
Mine Engineer,
(306) 933-8500

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Automation of mining equipment/machinery	11
2. Recirculation of mine air (ventilation systems)	9
3. Ore grade control decision analysis for automated systems	11 , 12

Tantalum Mining Corporation
of Canada Limited,
P.O. Box 2000,
LAC DU BONNET, MB,
R0E 1A0

R.A. Simard,
Mine Superintendent,
(204) 345-8658

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Stress analysis resulting from pillar reduction in room and pillar mining utilized to establish new pillar pattern.	7 , 10
2. Comparative button bit studies to determine the most appropriate $1\frac{3}{4}$ in. diameter rock bit for spodumene ore.	5 , 7

Algoma Steel Corporation Ltd.,
Algoma Ore Division,
George W. MacLeod Mine,
WAWA, ON,
P0S 1K0

A.L. Stevens,
Mine Manager,
(705) 856-4620

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computerized tracking of mine ores and grades.	4 , 11

Denison Mines Ltd.,
Elliot Lake Operations,
Box B-2600,
ELLIOT LAKE, ON,
P5A 2K2

Gaetan St. Denis,
Technical Services Engineer,
(705) 461-6285

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing search for and development of low profile (6.5 feet) mining equipment.	5
2. Continuing program of large-scale underground testing of bacterially assisted leaching methods.	12
3. Testing methods for mining, drying and conveying high grade fines recovered from sumps.	5 , 8
4. Use of consolidated fills for controlling violent pillar failures.	10
5. Evaluation of hydraulic drifters and feed rails.	5
6. Evaluation of aluminum-body jacklegs.	5
7. Testing and development of 45 mm button bits.	5
8. Development of a computerised system to perform month-end survey calculations for mine reporting and incentive/bonus schemes.	1 , 11
9. Evaluation of co-generation projects for production of steam and electrical power.	5
10. Remote monitoring and analysis of energy management systems.	1 , 11
11. Development of a high/low extendable platform for roofbolting and service installation purposes (pipes, cables etc.).	5

Domtar Inc.,
Sifto Salt Division,
Goderich Mine,
North Harbour Road,
P.O. Box 370,
GODERICH, ON,
N7A 4C6

D. Bray,
Manager, M,P&Eng.,
(519) 524-8351

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mechanical scaling; development of a roadheader type machine to facilitate scaling the back (roof) and face of headings.	5
2. Vacuum blower unit, designed using rotary vane type blower with a screen conveyor feed.	9

Neil Crocker, Mine Engineer.
Tel: (519) 524-8351

1. Mine modelling incorporating gas pressure statistics obtained by computerized monitoring of the overlying mine strata.	10 , 11
2. Pillar shielding experiment to reduce scaling requirements	10

Falconbridge Ltd.,
ONAPING, ON,
P0M 2R0

Lucien Vary,
Supt. Mines Tech. Srvs.,
(705) 966-3411

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Improving productivities in cut-and-fill stopes through mechanized bolting and scaling.	5 , 7
2. Pillar recovery in blasthole stopes against consolidated hydraulic fills.	7
3. Improvement of fill placement techniques to reduce cement content, segregation and dilution during pillar recovery.	10
4. Use of paste fills and other high modulus fills; state-of-the-art studies in progress.	10 , 11
5. Use of microseismic monitoring systems, installed at all Falconbridge mines and linkage to a central control room for continuous monitoring on a 24-hour basis.	10 , 11
6. Rockburst studies at Strathcona Mine jointly with CANMET and the Ontario government with emphasis on fault slip behaviour.	10
7. Development of 2-D and 3-D numerical modelling programs using the Distinct Element approach.	10 , 11
8. Blast vibration monitoring in blasthole stopes when mining against backfill.	10 , 9
9. Computer aided design for optimum mine planning.	4 , 11
10. Trials with a mechanized scaling machine and a mechanized rock bolting and screening machine.	5

11. Establishing a central control room at Strathcona for hoists and other materials handling functions. 8 , 9

12. Hydraulic hoisting of minus 3 in. rough screened ore up 2260 ft. at Onaping Mine (HDRK Project). 5 , 8

13. Design and development of a Compact Underground Boring machine (CUB) for hard rock mining operations. 5

Giant Yellowknife Mines Ltd.,
Timmins Division,
P.O. Bag 2010,
TIMMINS, ON,
P4N 7X7

Philip L. Lehoux,
Heap Leach Project Engineer,
(705) 235-3311

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Large scale heap leaching of low grade gold ore from open pit. The waste residue will be used as mine backfill.	12 , 3

Inco Limited,
Ontario Division,
Copper Cliff, ON,
P0M 1N0

R.C. Aelick,
Manager Mines Research,
(705) 682-5261

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Testing of "double-decked" crater blasting techniques.	7
2. Microseismic monitoring.	10 , 11
3. Investigation of iron ore blast furnace slag as a binding agent for fills.	10
4. Development of a 3-D numerical modelling system for rock mechanics.	10 , 11
5. Jointly developing, with Spar Aerospace, remote controlled underground equipment to screen and bolt in recently blasted areas.	5 , 11
6. High density fill.	8 , 10
7. Continuous mobile ore removal system.	5 , 8
8. 70 ton electric automated haulage truck.	5
9. The viability of blind shaft boring.	5 , 6

R. Mark, Senior Adviser.
Tel: (705) 682-5817

1. Development of a remote system for drilling holes and installing full column grouted bolts in bored raises.	5 , 10
2. Development of a more simple but more reliable full column grouted bolt and cable bolt support system.	5 , 10

Kidd Creek Mines Limited,
P.O. Box 2002,
TIMMINS, ON,
P4N 7K1

T.R. Yu,
Chief Engineer, R&D,
(705) 267-2161

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Loose rock sensing system for mechanized scaling.	5 , 11
2. Pozzolanic property of Cu ground slag.	10
3. Phase II of a project to improve underground communications.	1
4. Remote control for rockbreaking machines.	5 , 11
5. Mechanized excavation in consolidated rockfill.	5 , 7
6. Fragmentation optimization in stope blasting operations.	7
7. Hang-up relief techniques for drawpoints and ore passes.	5
8. Zeta potential control for enhanced drilling; to maximize bit penetration and prolong bit life.	7

Lac Minerals Limited,
Macassa Division,
P.O.Box 550,
KIRKLAND LAKE, ON,
P2N 3J7

E.N. Nelson,
Area Engineer,
(705) 567-5208

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mine monitoring and control system for pumps, fans and heating system.	11 , 9
2. Tailings reclamation using dredging and dry excavation.	3 , 12
3. Installation of microseismic system to monitor rock bursts.	10 , 11
4. Testing feasibility of replacing post in timbered drifts with cable slings.	10 , 2
5. Longhole mining in narrow veins.	7
6. Recovery of heat from waste mine water and compressors to preheat mine ventilation intake air.	9
7. Cemented rockfill.	10
8. Auxiliary ventilation with centrifugal fans.	9
9. Introduction of small capacity LHD equipment into narrow vein track mining operation.	5 , 8
10. Raise boring in highly stressed ground.	6 , 10
11. Construction and commissioning of new gold mill.	12

Lac Minerals Ltd.,
Page-Williams Mine Division,
P.O. Bag 500,
MARATHON, ON,
P0T 2E0

Stewart T. Brown,
Chief Mine Engineer,
(807) 238-1100

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Implementation of trial program to add 3% cement and 2% flyash to bind a minus 6 inch crushed rock backfill	10
2. Upgrade and automate a surface cement slurry plant to facilitate one man control	8 . 10
3. Upgrade mine hoisting system to 9000 tpd by installing 22 tonne skips and altering the hoisting cycle	5 . 8
4. Install and commission u/g radio communications system	1
5. Install and commission a high pressure pumping system for the handling of underground slimes (from sumps and settlers)	8 . 9
6. Test a hydraulic top-hammer longhole production drill	5 . 7
7. Upgrade mine ventilation to 1 million cfm. and commission PLC control for downcast heaters	9
8. Test trials of new underground bulk explosives handling vehicle	5 . 7
9. Design, install and commission an underground bulk lubricants handling system	8 . 9
10. Installation and commissioning of gyratory crusher and screen plant for production of crushed rock backfill	4 . 8
11. Test automated blast vibration monitoring equipment	1

Mattabi Mines Ltd.,
Lyon Lake Mine,
P.O. Box 190,
IGNACE, ON,
P0T 1T0

Manfred Lengwenus,
Mine Superintendent,
(807) 934-2291

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing development, trials and testing of remote-controlled LHD (scoop) underground operations.	5 , 11

Noramco Mining Corporation,
Golden Rose Mine,
General Delivery,
RIVER VALLEY, ON,
P0H 2C0

Dan Hewitt,
Chief Engineer,
(705) 858-3475

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mining method to reduce dilution from flat-lying veins (<30deg. dip), which are less than five feet in thickness	7

Noranda Minerals inc.,
Geco Division,
P.O. Box 100,
MANITOUWADGE, ON,
P0T 2C0

K.G. Byberg,
Chief Mine Engineer,
(807) 826-3211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Investigating the possibility of remote automation of production scram drift slushers.	8 , 11
2. Research on causes, effects and prevention of sulphide dust explosions.	1 , 9
3. Investigating the various methods of loading wet blastholes with non water resistant ANFO. (Kent MacNeill, Snr. blasthole tech.)	5 , 7
4. Investigate differences in ground disturbance caused by various blasting sequences as measured by vibration monitor. (Kent MacNeill, Snr. blasthole tech.).	7 , 10
5. Investigation of the ways to move ANFO horizontally without using-compressed air as a motive force. (Ken Culhane, Planning & Electrical Engr.).	7 , 8
6. Control of underground ventilation fans using a surface located personal computer system. (B. Horochuk & P. Beaulieu, Plan. & elect. Engrs.).	9 , 11
7. Evaluation of cement alternatives, such as the use of slags in hydraulic backfill materials. (Michael Zaiser, Snr. Contract & Research Engr.)	8 , 10
8. Study ways and means to attenuate vibration exposure for drill doctors and drill sharpening personnel. (Michael Zaiser, Snr. Contract & Research Engr.)	1 , 5

9. Development of blasthole lay-out pattern software, such as autolisp and autocad programs.
(L. Kneen & W. Harris, Survey/Blasting group.) 7 , 9

10. Development of engineering controls for environmental noise attenuation and personal hearing protection.
(Lester Kneen, Chief surveyor). 1 , 5

11. Development of an electronic survey notebook that can be coupled to a computer to prepare mine survey results and implement plotting.
(Lester Kneen, Chief Surveyor). 9 , 11

12. Development of computer programs to monitor exposure of workers to various, specified environmental toxic pollutants.
(Monica Kuntzel, Bonus & Research Tech.). 1 , 9

13. Investigation of blasting system using light generated energy to initiate blast - Photodet system.
(Kent MacNeill, Snr. Blast. Tech.) 7 , 11

14. Phasing-in automation of mine production scram drift operation.
(Doudlas Sands. Spvr. Eng. Services.) 7 , 11

Placer Dome Inc.,
Campbell Mine,
P.O. Box 10,
BALMERTOWN, ON,
P0V 1C0

Gordon Reid,
Chief Engineer,
(807) 735-2075

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Microseismic monitoring.	10 , 11
2. Mine wide seismic monitoring system for determining mechanisms of rockbursts.	10 , 11
3. Microcomputer based core logging system.	3
4. Microcomputer based survey calculation system.	9
5. Destressing in situ rock for mining crown pillars.	7 , 10
6. Design of support systems for mines subject to rockbursts.	4 , 10
7. Implementation of smooth wall blasting techniques for ground control in cut-and-fill stoping.	4 , 10
8. Installation and testing of minewide underground radio communications system.	1 , 5
9. Determination of optimum fly ash/cement ratio for cemented mine backfill material.	8 , 10
10. Evaluation of backfill as support in rockburst prone areas by installation and monitoring suitable instrumentation.	10
11. Macroseismic monitoring system - rockburst research project.	10
12. Development of ground support techniques suitable for protection against moderate strength rockburst activity.	10 , 4
13. Design of longhole mining methods for use in highly stressed and rockburst prone crown pillars.	10 , 4
14. Optimizing drill hole size and pattern for longhole mining methods.	4

Placer Dome Inc.,
Detour Lake Mine,
130, Wilson Ave.,
TIMMINS, ON,
P4N 2S9

John Mahon,
Human Resources Supt.,
(705) 245 3211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Experience with a remote fly-in mining operations.	1

Placer Dome Inc.,
Dome Mine,
Box 70,
SOUTH PORCUPINE, ON,
P0N 1H0

Dale Churcher,
Special Projects Engineer,
(705) 235-3221

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Additive binders for cohesion and water reduction in dense fills.	10
2. Development and verification of computerized cut-and-fill panel design.	4 , 10
3. Refinement of placement techniques for paste fills.	8 , 10

Renabie Gold Mines Ltd.,
P.O.Box 65,
MISSANABIE, ON,
P0M 2H0

Harry Margolis,
Senior Planning Engineer,
(705) 234-2333

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Sub-level caving will be started below 3510 level.	4
2. Sub-level open stoping being introduced on 3930 level	4
3. Installation of raise elevator in 3930-3510 service raise.	5 , 8

Rio Algom Limited,
Elliot Lake Operations,
P.O. Box 1500,
ELLIOT LAKE, ON,
P5A 2K1

S.N. Muppalaneni,
Supt. Mining Services,
(705) 461-4325

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation of computerized survey calculations.	9 , 11
2. Underground radio communications.	1 , 11
3. Deep level conveyor hoisting from several loading points fitted with grizzlies and rock breakers.	5 , 8
4. Containerized materials handling.	5 , 8
5. Low profile roofbolting and screening platform.	5 , 10
6. Trials and evaluation of fracturing and in situ bacterial leaching of sub-marginal uraniun ore, ie. not in ore reserves	2 , 7
7. Trials for downsizing existing electric hydraulic drills and drill strings to effect more economic use of explosives	5 , 7

JM Asbestos Inc.,
Asbestos, PQ,
J1T 3N2

Denis N. Roy,
L'assistant ingénieur chef,
(819) 879-5431

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rock bolting open pit walls.	10
2. Remote control of primary crusher operation.	11 , 12
3. Mesure des mouvements verticaux d'un banc par nivellement hydraustatique.	4 , 10
4. Remote surveillance of mine plant entrances.	1 , 9
5. Programmable controller for packaging operation.	12
6. Étude statistique du contrôle de qualité.	12
7. Méthode statistique de contrôle de procédés.	11 , 12
8. Informatisation de la conception et planification.	4 , 11
9. Automatisation de la lecture des inclinomètres.	10 , 11
10. Plan de la nappe phréatique entourrant le gisement.	3
11. Étude de faisabilité d'un rideau d'étanchéité pour réduire les venues d'eau.	2 , 10
12. Inclinométre profond résistant à des déformation importantes.	10
13. Controleurs programmables pour l'opération de conveyeurs à navette.	12

LAB Chrysotile inc.,
835, rue Mooney,
C.P. 459,
THETFORD-MINES, PQ,
G6G 5T5

Gaston Verreault,
Vice-président,
(418) 338-7500

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Pierre Laroche, Directeur, contrôle de la qualité Tel: (418) 338-7500	
1. Développement de grades d'amiante chrysotile de remplacement.	1 , 12
2. Étude de l'automatisation du contrôle de la qualité des fibres en usine	12
Luc Michel, Directeur, services auxiliaires Tel: (418) 338-7500	
1. Étude d'évaluation stratégique des options de gestion des rejets d'amiante	3 , 8
Robert Gale,Directeur, ingénierie d'usinage. Tel: (418) 338-7500	
1. Une étude de la robotisation de l'empilage des sacs d'amiante	11 , 12
2. Le contrôle des ensacheuses par ordinateur	11 , 12
3. Étude de réduction des coûts d'énergie requise pour le séchage du minerai	12
4. Étude de la récuperation des fractions fines des résidus d'amiante	12
5. Étude de l'automatisation de l'emballage des unités de sacs d'amiante	12 , 11

Les Explorations Muscocho ltée,
Mine Montauban,
C.P. 10,
NOTRE-DAME de MONTAUBAN, PQ,
G0X 1W0

F.A. Johnson,
Directeur,
(418) 336-2777

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE

Pierre Delisle, Ingénieur de projets.
Tel: (418) 336-2777

1. Dimensionnement de piliers et chantiers; recouvrement des piliers; évaluation de la stabilité par modelisation numérique. 4 , 10

Les Mines Seleine inc.,
Leslie, Grosse-Île,
C.P. 60,
ÎLES-DE-LA-MADELEINE, PQ,
G0B 1M0

Danielle Gagnon,
Ingénieur en chef,
(418) 985-2931

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rock mechanics computer simulation model.	10 , 11

Les Mines Selbaie,
Case Postale 370,
JOUTEL, PQ,
J0Y 1N0

Jean-Luc Chouinard,
Chef Ingénieur,
(819) 756-2491 poste 232

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Étude et mise au point des sautages dans une mine de surface.	7
2. Production d'un pilier de surface sous 40m de till.	7 , 10

Les Mines Sigma (Québec) Ltée.,
VAL D'OR, PQ,
J9P 4N8

Christian Pichette,
Ingénieur-en-chef,
(819) 825-8476

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Fabrication d'une mini-foreuse longs trous électrique-hydraulique. (projet avec CRIQ, prévu pour l'été 1989)	5
2. Expérimentation d'arches d'acier pour maintenir des galeries dans la méthode coupe-et-remblai. (mise en production d'un chantier prévue pour le premier trimestre 1989).	7 . 10
3. Séquence de minage des réserves dans un secteur sujet à des coups de terrain.	4
4. Système de calculs d'arpentage et de boni informatisé.	9

Les Ressources Camchib Ltée.,
C.P. 3400,
CHIBOUGAMAU, PQ,
G8P 2K9

W. Zuckerkandel,
Directeur Adjoint,
(418) 748-2625

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation d'une mini chargeuse-navette électrique (80 cm de large).	5 , 8
2. Approfondissement du puits de Cedar Bay (1455 pi) et installation d'une nouvelle salle d'extraction.	6 , 9

Les Services TMG (NIOBEC) inc., Chicoutimi Mine, 3400, Chemin du Colombium, C.P. 70, ST-HONORÉ, PQ, G0V 1L0	M. Rodrigue, Directeur, (418) 673-4694

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Forage de production à grand diamètre (6.5 po ou 16.5 cm) de 90 m (300 pi).	7

Minerais LAC Limitée,
Division Bousquet,
C.P. 1180,
MALARTIC, PQ,
J0Y 1Z0

Luc Pacquette,
Surintendant sous-terre,
(819) 759-3631

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Essai de foreuse "Roger" pour forage de monterie à petit et moyen diamètre.	5
2. Essai d'un nouveau patron d'installation en parallèle de câbles cimentés dit "mandolin" (parallel or mandolin cable bolting pattern).	10
3. Système de ventilation avec prises d'air dans le plancher pour un atelier de soudure sous-terre.	9

Minerais LAC limitée,
Division Est-Malartic,
C.P. 1150,
MALARTIC, PQ,
J0Y 1Z0

Marlène Lanouette,
Chargé de projet,
(819) 759-3631

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Contrôle en continu des valeurs aurifères.	3 , 12
2. Thiourée : techniques d'utilisation et contrôle.	12

Minéraux Noranda Inc.,
Division Matagami,
MATAGAMI, PQ,
J0Y 2A0

Claude Bégin,
Surintendant des Mines,
(819) 739-2511

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Système automatisé pour le remblayage hydraulique au projet Isle-Dieu.	8 , 11
2. Conversion à l' énergie électrique d'une chargeuse-navette ST-5 diesel.	5
3. Installation de 2 systèmes microséismiques 16 canaux à la Mines Isle-Dieu.	10 , 11
4. Monitoring des portes de ventilation et des ventilateurs de surface et souterrains. Aussi la programmation des périodes de marche et arrêt des ventilateurs.	9 , 11

Mines Belmoral Ltée,
C.P. 7000,
VAL D'OR, PQ,
J9P 5K3

Serge Gagnon,
Directeur de la Mine,
(819) 825-5125

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Étude de stabilité par caractérisation de la masse rocheuse et modélisation numérique.	3 , 4

Minnova Inc.,
Division Lac Dufault,
C.P. 2000,
NORANDA, PQ,
J9X 5B4

Richard Sanson,
Ingénieur en chef,
(819) 797-2501

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Implantation d'un programme de mécanique des roches pour déterminer la méthode de minage d'un gisement à grande profondeur.	10
2. Informatisation des tâches telles le dessin, l'arpentage et le dynamitage, ainsi que la ventilation et les rapports de production.	9 , 11
3. Informatisation d'un système de calcul de boni.	9 , 11
4. Recherche sur le phénomène de 'soft inclusion' dans les roches encaissante dure.	10
5. Potentiel de coup de toit dans les mines à grande profondeur.	10
6. Implantation d'un programme de mécanique des roches pour aider au dimensionnement des chantiers dans un gisement à grande profondeur.	10 , 7

Minnova inc.,
Division Lac Shortt,
C.P. 539,
CHAPAIS, PQ,
G0W 1H0

Laval Gilbert,
Ingénieur en Chef,
(819) 753-2571

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Étude de faisabilité de l'approfondissement de la mine du niveau 500 au niveau 800	2
2. Simulation sur ordinateur de l'exploitation et calibration du modèle à l'aide d'extensomètres	11 , 10

Minnova Inc.,
Division Opémiska,
C.P. 10,
CHAPAIS, PQ,
G0W 1H0

Jean-Marie Couture,
Surintendant général,
(418) 745-2501

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Utilisation et faisabilité télécommande Cavo 310 et Cavo 320.	5 , 11
2. Étude statistique de la distribution des échantillons de minerai (Au) dans les points de soutirage.	3 , 8
3. Relevé de vitesse particulaire (vibration), exploitation chantier long trou 6.5 po (162.5 mm) dia. pilier de surface.	3 , 7

Placer Dome Inc.,
Mine Kiena,
C.P. 9000,
VAL D'OR, PQ,
J9P 6A5

Jean Chamberland,
Ingénieur chef,
(819) 738-4031

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Communication systems for underground workers.	1
2. Simulation du réseau de ventilation sur micro-ordinateur.	9 , 11
3. Computerized surveying system using CAD system to update mine plan.	9 , 11
4. Software aided mine design - mine planning.	9 , 11
5. Programmable controller for peak control	9 , 11

QIT-Fer et Titane inc.,
Lac Tio,
951, boul. de l'Escale,
C.P. 160,
HAVRE ST-PIERRE, PQ,
G0G 1P0

Jean-Pierre Roy,
Surintendent Adjoint Production,
(418) 538-3317

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Utilisation du logiciel de planification minière PC-Mine.	4 , 11

Québec Cartier Mining Company,
PORT CARTIER, PQ,
G5B 2H3

Raynald Fournier,
Director Engineering and Research,
(418) 768-2274

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Elaboration d'un modèle de gestion des stocks de concentré et boulettes au port.	8 . 11
2. Lecture en continu du profil des rails (chemin de fer).	11
3. Recherche d'un liquide de coupe pour améliorer la vitesse des foreuses.	11

Denison-Potacan Potash Company,
P.O. Box 5005,
SUSSEX, NB,
E0E 1P0

D.C.E. Waugh,
Superintendent of Engineering,
(506) 839-2146

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rock mechanics instrumentation for an underground potash mine using backfill operations.	10
2. Use of backfill in potash mining (modelling).	10 , 11
3. Use of backfill in potash mining (laboratory and in-situ testing).	10
4. Testing a non-rotating balance rope with plastic filled valleys.	9

Gordex Minerals Ltd.
P.O.Box 7079,
Stn. A,
SAINT JOHN, NB,
E2L 4S5

H.E. Pawson, P.Eng.
President & C.O.O.
(506) 633-2088

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Doubling of vat leaching capabilities for treatment of gold ore after successful completion of 1987 plant trials.	12

Potash Corporation of America Inc.,
N.B. Potash Operations,
P.O. Box 1489,
SUSSEX, NB,
E0E 1P0

Brian Roulston,
Geologist,
(506) 433-5445

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development and implementation of a integrated rock mechanics program for cut and fill potash mining.	7 , 10

University of British Columbia,
Dept. Mining and Mineral
Process Engineering,
6350, Stores Road,
VANCOUVER, BC,
V6T 1W5

A.L. Mular
Professor and Head MMPE,
(604) 228-3983

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computer program for estimating capital and operating costs.	2 , 11

C. Brawner, Professor - MMPE
Tel: (604) 228-3986

1. Linkage algorithm for finite element/boundary integral methods for specific rock mechanics and underground mining applications.	10
2. Pillar strengthening with grouted untensioned rebar or bolts.	10
3. Pit slope stability mining through underground slopes.	10
4. Development of buckling failure analysis.	10
5. Mine drainage to improve rock slope stability using vacuum assist techniques	10
6. Evaluation of the efficiency of tunnel borers.	5

Dr.A.E. Hall, Mining Professor.
Tel: (604) 228-3983

1. Recirculation of mine ventilation air in order to decrease heating costs.	9
2. Coal blending computer model for improved mine planning.	4 , 11
3. Examination of sulphide dust explosions in Canadian mines.	1 , 9

4. Development of a file of mine service planning computer models that are compatible with the IBM-PC. 4 , 11

5. Research on ceramic filters and their use underground to clean diesel exhaust gases. 5 , 9

6. Development of PNET program for project scheduling. 1 , 4

7. Completion of hoist design computer program for drum, friction and Blair hoists. 5 , 9

P.D. Lawrence, Department of Electrical Engineering.
Tel: (604) 228-3983

1. Tele-robot interfaces for machine operation (UBC). 11

Dr.H.D.S. Miller, MMPE.
Tel: (604) 228-3983

1. Application of rock mechanics methods for the design of underground mines. 4 , 10

A.J. Reed, Mining Professor.
Tel: (604) 228-3983

1. Economics of mining wollastonite. 2

2. Economics of mining zeolites. 2

Dr.A.J. Sinclair, Head Geological Sciences.
Tel: (604) 228-3763

1. Geostatistical ore reserve estimation (north Buckhorn deposit, Nevada). 2

2. Preliminary geostatistical study, Mascot Gold Mines, Hedley, BC. 2

3. Co-kriging as an aid to reserve estimation of precious metals. 2

University of Alberta,
Department of Mining,
Metallurgical and Petroleum Engineering,
606 Chemical-Mineral Building,
EDMONTON, AB,
T6G 2G6

Dr. Ken Barron,
Professor of Mining,
(403) 432-3810

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design criteria for pillars in coal mines.	4 , 10
2. Outbursts at No.26 Colliery, Glace Bay (Nova Scotia)	10
3. Size effects on the triaxial strength of coal.	10
4. Design of artificial supports for footwall bedded slopes with particular attention to counteracting the "buckling" failure mode.	4 , 10
5. Cutter roof failure in coal mines - investigation of theoretical conditions, modelling results and comparison with case histories.	4 , 10
6. Study of pillar behaviour where burst conditions exist in longwall coal mines. Co-operative project with Pittsburgh Research Centre, USBM.	4 , 10

University of Manitoba,
Department of Geological Engineering,
314 Engineering Building,
WINNIPEG, MB,
R3T 2N2

Brian Stimpson,
Professor and Head of Dept.,
(204) 474-8596

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Stability and rock bolting of layered strata.	10
2. Stability in potash mining	10
3. Mining induced fracture - Potash mining	10

University of Saskatchewan,
Department of Geological Sciences,
SASKATOON, SK,
S7N 0W0

Dr. D.J. Gendzwill,
Professor of Geophysics,
(306) 966-5693

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Natural and induced seismicity in Saskatchewan.	10
2. Three dimensional (3-D) seismic reflection surveys from surface for use in potash mine planning exercises.	10
3. Electromagnetic sounding system for strata control in potash mines.	10
4. Seismicity and geophysical engineering in potash mines.	3 , 10
5. Consideration of the glacial and/or regional thrust structures when designing highway cuttings in Saskatchewan.	10
6. Study of faults and jointing in relationship to open pit coal mining operations in southern Saskatchewan.	10

Dr. D. Stead, Assistant Professor.
Tel: (306) 966-5714

1. Study of fracture mechanisms in rocks using ultrasonics, electron microscopy and mathematical modelling techniques.	10

Lakehead University,
School of Engineering,
Oliver Road,
THUNDER BAY, ON,
P7B 5E1

Dr. J.G. Locker,
Director,
(807) 345-2121

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Dr. Inder Nirdosh, Associate Professor. Tel: (807) 345-2121	
1. Processes for obtaining environmentally safe uranium mill tailings.	3 , 12
Henry North, Professor, Mechanical Engineering. Tel: (807) 343-8684	
1. Low frequency cavitation processing.	11, 12
2. Resonance grinding.	11, 12
Dennis Roddy, Professor, Electrical Engineering. Tel: (807) 343-8437	
1. Analysis and interpretation of sub-surface radar signals.	11

Laurentian University,
Centre for Mining and Mineral
Exploration Research (CMMER),
Ramsey Lake Road,
SUDBURY, ON,
P3E 2C6

Dr. D. Trotter,
Executive Director,
(705) 673-6572

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Underground mine lighting standards.	9
2. Guidelines for underground rail haulage.	8

Drs. P. Beckett, C. Courtin and G. Tapper, Research Scientists.
Tel: (705) 675-1151

1. Remote sensing as an aid to mineral exploration in northern terrains.	3

Dr. F.W. Clulow, Research Specialist.
Tel: (705) 675-1151. x2275

1. Radionuclides in mammals living in drainage systems associated with uranium mine tailings	3

Dr. B. Kaye, Professor of Physics.
Tel: (705) 675-1151

1. Design and testing of respirator efficiency.	5 , 11
2. Fractal characterization of composite materials.	11
3. Fractal applications to fragmentation processes in the minerals industry.	11
4. Development of a soft-wall permeameter for online monitoring of grinding circuits.	12

5. Feasibility study on the optimization of integrative ergonomics for mine safety equipment. 1 , 5

Dr. M.A. Persinger, Professor.
Tel: (705) 675-1151, x4252

1. Monitoring and analysis of seismic events in the Sudbury Basin for use in correlating rockburst phenomena with mining operations; prediction of risk of rockbursts. 10

Dr. Lloyd.D. Reed, Professor of Physics.
Tel: (705) 675-1151

1. Investigation of light charged particles emitted by rocks during fracture. 10 . 11
2. White Finger (Raynauds) disease. Prevention of this disease caused by vibration. (joint project with Dr. Debra A. Bakker). 1 . 9

Dr. G. Rubin & Dr. M. Leach, Dept. of Physics.
Tel:(705) 675-1151, ext 2286.

1. Hardrock fragmentation using sonic and ultrasonic resonances. 11
2. Acoustic emission spectral analysis and its application in ground control technology. 10. 11

Dr. K. Westaway, Research Specialist.
Tel: (705) 675-1151, ext 2105.

1. The lifetimes and pathways of the PAHs and mutagens in dieselized underground mines. (Dr.D.Hallman, assoc. researcher) 1
2. Determination of the nitro PAHs and mutagens generated by the catalytic converters used on underground diesel equipment. (Dr.D.Hallman, assoc. researcher) 1

Dr. K. Winterhalder, Chairman Dept. of Biology.
Tel: (705) 675-1151

1. Monitoring of nitrogen status (concentrations) in soils rendered barren by industrial activity and/or revegetated for reclamation purposes. 3

Laurentian University,
School of Engineering,
Ramsey Lake Road,
SUDBURY, ON,
P3E 2C6

Dr. D.E. Goldsack,
Dean, School of Engineering,
(705) 675-1151

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Chemo-abrasive water jet cutting of rocks.	5 , 11
2. Studies on densified backfill	10

Dr. Laxman M. Amaratunga, Professor.
Tel: (705) 675-1151

1. Study of sulphide dust explosions in Canadian mines - a fine particle approach.	1, 9

Dr. Debra A. Bakker, Assistant Professor.
Tel: (705) 675-1151 ext.2251

1. White finger. Preliminary study on prevention of Raynauds disease. Joint project with Dr. Lloyd D.Reed.	1 , 9

Dr. A. Farah, Professor.
Tel: (705) 675-1151

1. Studies on densified backfill material.	10
2. Resin/cement grouted bolts in underground mining.	4 , 10

Dr. M. Hajdasinski, Associate Professor.
Tel: (705) 675-1151

1. Optimization of drift size and the practical application of using standard dimensions. 4
2. Economic evaluation and optimization of mine reconstruction. 2 , 4
3. Critical analysis of the payback period project evaluation criterion. 2

Dr. Michael L. Jeremic, Professor.
Tel: (705) 675-1151 ext.2250

1. Ground de-stressing by camouflet blasting 10
2. Stability analysis of rock salt mines - conventional underground and solution mining. 10

Dr. J. Partyka, Associate Professor.
Tel: (705) 675-1151 ext. 2243

1. Program for calculating the performance of a multi-stage horizontal spray chamber. 9
2. Computerized calculations of air temperature increases in mine excavations 9

Dr. S.P. Singh, Associate Professor.
Tel:(705) 675-1151 x2247

1. Guidelines to controlled blasting underground using small diameter blast holes. 7 , 10
2. Cutability and abrasiveness of hard rocks. 10

Laurentian University,
Centre for Geomechanics Research,
Ramsey Lake Road,
SUDBURY, ON,
P3E 2C6

Peter K. Kaiser,
Professor/Chairman,
(705) 673-6517

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Feasibility of stainless steel ground support.	4
2. Numerical modelling of ground response to excavation.	10
3. In situ stress measurement data analysis for nuclear waste repository.	10
4. Hard rock tunnel boring machine evaluation.	4
5. Fault slip rockburst study.	10

Queen's University,
Department of Mining Engineering,
Goodwin Hall,
KINGSTON, ON,
K7L 3N6

Peter Calder,
Head, Dept. Mining,
(613) 545-2196

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Pit slope stability studies.	4 , 10
2. Control blasting.	7 , 10
3. Open pit simulation studies.	2 , 4
4. Microseismic emissions related to rock failure.	10
5. Computerized open pit feasibility and design.	2 , 4

James F. Archibald, Associate Professor.
Tel: (613) 545-2198

1. Development of microseismic monitoring networks for rockburst precursor detection and rapid in-situ stress assessment.	10
2. Long term subsidence prediction in potash extraction operations based on field monitoring, laboratory measurements and computer modelling studies.	4 , 10
3. Assessment of quality control parameters influencing in situ backfill competence.	4 , 10
4. Use of chemical gelling agents as cement replacement materials in backfills.	4 , 10
5. Use of total tailings for backfill support.	2 , 4

Garston Blackwell, Associate Professor.
Tel: (613) 545-2204

1. Open pit mine design and production scheduling using microcomputers and CAD systems.	4 , 11

Dr. P. Katsabanis, Professor.
Tel: (613) 545-2196

1. Fragmentation control through blasting	7

Charles W. Pelley, Assistant Professor.
Tel: (613) 545-2205

1. Continuous materials handling systems - Design and feasibility in medium sized hardrock mines.	4 , 8
2. Studies in mine sequencing in deep narrow vein deposits to minimize stress induced ground control problems.	4 , 10
3. Expert system for risk analysis in mine feasibility.	2 , 11
4. Assessment of mining methods involving stope re-development (stope pillar recovery) through stabilized fill.	4 , 6

Dr. R. Paul Young, Associate Professor.
Tel: (613) 545-6171

1. Rockburst investigations using tomographic imaging and acoustic emission techniques.	10 , 11
2. Seismic characterization of discontinuities and anomalous rock quality within mine surface crown pillars using attenuation and velocity imaging techniques.	10 , 11
3. Seismic and ultrasonic characteristics of anisotropic rocks	10 , 11
4. Microseismic monitoring at AECL's underground research laboratory	10 , 11

5.	Applications of geotomographic imaging in potash mining	10 , 11
6.	Microseismic monitoring at Noranda's Norita Mine and the Brunswick Mine.	10 , 11
7.	Microseismic monitoring at Noranda's Golden Giant Mine at Hemlo.	10 , 11

University of Waterloo,
Department of Earth Sciences,
WATERLOO, ON,
N2L 3G1

Dr. Maurice B. Dusseault,
Chairman, Geological Engineering,
(519) 888-4590

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Behaviour of halite tailings as backfill.	10
2. Reclaimed strip mine subsidence.	3
3. Development of an Expert System for geophysical log interpretation.	3 , 11
4. Study of the mechanical behaviour and permeability properties of oil sands.	10
5. Waste management for oil sands mines.	3
6. Constitutive behaviour of salt rocks.	10
7. Viscoplastic numerical model development.	10 , 11

Dr. John A. Cherry, Dept. Earth Sciences.
Tel: (519) 885-1211

1. Geochemical evolution and the mobility of trace heavy metals at the Heath Steele Mine tailings, New Brunswick.	3
2. Field evolution of tailings abandonment techniques.	2 , 3
3. Geochemical evolution of the Delnite Mine tailings, Ontario.	3
4. Geochemistry of the Vadose zone of the Waite Amulet tailings impoundment.	3

Dr. John A. Franklin, Research Professor.
Tel: (519) 885-1211 ext. 2624

1. Digital photoanalysis of rock jointing.	10 , 11
2. Measurement of fragmentation	8 , 10
3. Measurement of blast damage	3 , 11
4. Flow in jointed rock	3 , 10
5. Rock mass characterization	10 , 11

Collège de la région de L‘amiante,
Centre spécialisé en technologie
minérale,
671, boul. Smith S.
THETFORD-MINES, PQ,
G6G 1N1

Réjean Nadeau,
Directeur,
(418) 338-8591

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Ensemencement des haldes minières à l'aide des boues d'une usine d'épuration.	3
2. Automatisation des procédés de contrôle de la qualité de la fibre d'amiante par la méthode de S.P.C.	11 , 12

Ecole Polytechnique,
Centre canadian d‘automatisation
et de robotiques minières,
Case postale 6079, Succursale A,
MONTRÉAL, PQ,
H3C 3A7

Dr. André Piché
Directeur général, CCARM,
(514) 340-4049

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Automatisation de l'opération d'un brise-roches par rétroaction visuelle.	11 , 5
2. Mise au point d'un système de télécommande en vue de l'opération de l'équipement minier souterrain sans visibilité du site de travail.	5 , 11
3. Télésurveillance des chargeurs-transporteurs.	5 , 11
4. Évaluation des systèmes de guidage et leur potentiel d'application à des chargeurs-transporteurs.	5 , 11

Ecole Polytechnique,
Département de génie minéral,
Case postale 6079,
Succursale A,
Montréal, PQ,
H3C 3A7

Denis E. Gill,
Professeur titulaire,
(514) 340-4865

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Modèle de comportement unifié du sel gemme.	10
2. Effet de la redistribution des contraintes sur la convergence des excavations souterraines dans le sel gemme.	10
3. Contrôle de la température lors de la saignée avec les "doorstoppers" modifiés.	5 , 10
4. Effet de l'historique de chargement avec la méthode convergence confinement.	10
5. Essais de poinçonnement des parois latérales des trous de sonde.	10
6. Évaluation du potentiel de coups de toit d'une mine.	4 , 10
7. Prévision des effets de l'utilisation des rejets de sel comme matériaux de remblayage sur l'affaissement de surface des mines de sel domal.	4 , 10
8. Analyse de stabilité de piliers de surface.	10
9. Adaptation de la technique du "Doorstoppers" modifiée aux massifs de roches hétérogènes élastoviscoplastiques.	10

Robert P. Chapuis, Chercheur.
Tel: (514) 340-4427

1. Intéractions hydrauliques-mécaniques dans les essais de perméabilité en place : essais ponctuels et essais de pompage.	3 , 11

2. Évolution des propriétés hydrauliques des agrégats routiers.	3
3. Influence du scellement sur le niveau d'eau fourni par un piézomètre.	3 , 11
4. Bilans hydrogéologiques dans un parc à résidus miniers.	3
5. Anisotropie de perméabilité des sols et des roches.	3
6. Influence de l'eau de forage sur les mesures de perméabilité.	3 , 5
7. Représentativité de la perméabilité obtenue par essais de pompage.	3 , 10

J. Elbrond, Professeur.
Tel: (514) 340-4923

1. Modélisation de la productivité d'une machine seule, de l'interaction homme-machine et d'un système de machines.	1
2. Perte de minerai et dilution par des stériles.	7
3. Optimisation des contours des exploitations à ciel ouvert.	4

François Soumis, Département de génie industriel.
Tel: (514) 340-4515

1. Logiciel d'affectation en temps réel des camions dans une mine à ciel ouvert.	8 , 11

McGill University,
Department of Mining and
Metallurgical Engineering,
McConnell Engineering Building,
3480 University Street,
MONTRÉAL, PQ,
H3A 2A7

Dr. Malcolm Scoble,
Director of Mining,
(514) 398-4374

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mine backfill design and performance.	10
2. Monitoring machine breakage of rock.	5 , 11
3. De-stress blasting design.	10
4. Tunnel probe drilling for poor quality ground.	10
5. Expert system development for mine design/control.	4 , 11
6. The mechanics of digging/mucking in fragmented rock.	5 , 7

Dr. A.A. Afrouz, Professor
Tel: (514) 398-4378

1. Gate road supports	6 , 10
2. Development of monolithic and semi-monolithic pack materials for soft rock mining and hard rock bulkheads in backfill.	7 , 10
3. Rock fragmentation	6, 10 ,
4. Pillar support mechanisms.	4 , 10
5. Ground control.	10
6. Slope stability and slope reinforcement.	4 , 10
7. Slope optimization for surface mines.	4 , 10

Ralph Akhras, Dept. Mine & Met. Engineering.
Tel: (514) 398-4380 Ext. 5513

1. Automation of drilling machines. 5 , 7
2. Automation of grading ore. 8 , 11
3. Development of vision systems for use in closed-loop control of automated drilling operations. 5 , 11
4. Automated drillhole pattern recognition with vision control. 5 , 11
5. Slope optimization in open pit mines. 3 , 10

Dr. Michel L. Bilodeau, Associate Professor.
Tel: (514) 398-4382

1. Development of micro computer software to evaluate new mine investment proposals. 2 , 11
2. Optimization of mine development and operating variables. 2 , 11
3. Risk analysis in mining investments. 2 , 11
4. Simulation of mine operating decisions. 2 , 11

Jeffrey Davidson, Lecturer.
Tel: (514) 398-4375

1. Integrated drill and shovel monitoring in surface coal mining. 7 , 11
2. Rehabilitation of old mines. 2 , 3

Dr. John B. Edwards, Professor.
Tel: (514) 398-6653

1. Scientific mining automation: simulation, modelling, vision control and robotics. Composite project involving NSERC, SERC and industry. 5 , 11

Dr. F.P. Hassani, Mining Professor.
Tel: (514) 398-4377

1. Rock-support interaction studies.	10
2. Development of new pack material for coal mines.	10
3. Acoustic emission technology applied to mining.	10 , 11
4. Stability of gate roadways in underground coal mines.	4 , 10
5. Paste backfill characteristics.	10
6. Design techniques for steel support in mine tunnels.	4 , 5
7. Development of new cable bolting support systems.	10
8. Design a method of cut-and-fill for post pillar mining.	4 , 7

Yves Lizotte, Assistant Professor.
Tel: (514) 398-4379

1. A semi-automated truck dispatching system.	8 , 11
2. Optimization of underground mine design.	4 , 11
3. Simulation of underground haulage.	8 , 11
4. Computerized open pit design.	4 , 11
5. Optimization of fragmentation in underground blasthole mining.	7

Dr. R.R. MacLachlan, Associate Professor of Mining.
Tel: (514) 398-4376

1. Blast fragmentation studies.	3 , 7
2. Ultrasonic surveying for improved drilling and blasting practices.	7 , 9

3. Integration of blasting techniques to improve stability, loading and transportation. 7 , 10

4. Evaluation of blasting and stability in cut and fill mining. 7, 10

Dr. H.S. Mitri, Professor.
Tel: (514) 398-4375

1. Design and analysis of underground steel support systems. 4 , 10

2. Stability of underground excavations. 10

3. Study of numerical modelling techniques applicable in mining engineering. 3 , 11

Université du Québec à Chicoutimi,
Centre d'étude sur
les ressources minérales,
555, boul. Université,
CHICOUTIMI, PQ,
G7H 2B1

G. Archambault,
Directeur,
(418) 545-5011

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Hydrogéologie de zones de faille et de cisaillement en socle cristallin.	10
2. Productivité des aquifères du socle précambrine au Burkina Faso.	10
3. Simulation numérique, stochastique et expérimentale des zones de cisaillement et de la fracturation induite dans ces zones.	10
4. Modélisation stochastique de la distribution spatiale de la déformation et de la fracturation dans les zones de cisaillement.	10
5. Simulation expérimentale et développement d'un outil informatique pour la prévision des effets d'une rigidité normale sur les relations contraintes-déplacement des discontinuités dilatantes en massifs rocheux fracturés.	4, 10

Université du Québec
en Abitibi-Témiscamingue,
URSTM,
42, rue Mgr Rhéaume Est,
Case postale 700,
ROUYN, PQ,
J9X 5E4

Jean A. Renaud,
Le coordonnateur URSTM,
(819) 762-0971 poste 535

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Étude du potentiel de coups de toit dans les mines de l'Abitibi.	10
2. Comportement anisitrope des argiles sensibles; étude de la stabilité des ouvrages excavés dans un terrain argileux.	10
3. Vision artificielle stéréo - recherche bibliographique	11
4. Mécanique des roches argileuses, simulation informatique.	11 , 10

Université Laval,
Faculté des sciences et de génie,
Département de mines et métallurgie,
Cité Universitaire,
SAINTE-FOY, PQ,
G1K 7P4

Dr Pierre Choquet,
Professeur génie minier,
(418) 656-5273

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of a computer program for simulation of pulling or drawing ore drawing from stopes.	7 , 8
2. Instrumentation of cable-bolts in underground and open pit mines.	10
3. Improvement of subroutine DISCO (solving principal stresses along discontinuity planes) to account for progressive failures, blasting effects and spacing/size of discontinuities.	4, 10
4. Mechanics of toppling failure in rock slopes.	10
5. Preparation of a "Technical guide for grouted cable-bolts used as ground support".	4 , 10
6. Development and testing of a tension measuring gauge for cable-bolts used for ground support.	10 , 11

Jean-Luc Collins, Professeur.
Tel: (418) 656-2431

1. Création d'une station CAO/DAO et intégration dans l'enseignement des techniques.	4 , 11

Kostas Fytas, Professeur.
Tel: (418) 656-5057

1. Comparaison entre deux méthodes d'analyse informatisée des réseaux de ventilation, notamment la méthode conventionnelle et la méthode thermodynamique.	9

2. Développement de systèmes experts pour la sélection de l'équipement dans les mines à ciel ouvert. 4 , 11

3. Optimisation de la planification de la production des mines à ciel ouvert. 4

4. Simulation des systèmes pelles-camions. 5 , 11

5. Évaluation des techniques de géostatistique nonparametrique (krigeage de l'indicatrice, krigeage probabiliste). 7 , 2

Technical University of Nova Scotia,
Director of Minerals Engineering Centre,
Department of Mining
and Metallurgical Engineering,
P.O. Box 1000,
HALIFAX, NS,
B3J 2X4

Dr. L.A. Adorján,
Head of Department,
(902) 429-8300

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Beneficiation study of the Conwest barite from Lake Ainslie.	12
2. Recovery of gold from pyritic tailings.	12
3. Concentration of Nova Scotia magnetite.	12
4. Beneficiation tests on marble	12
5. Recovery of gold from Georgia, U.S.A. ores.	12

Dr. H.A. Hancock, Professor.
Tel: (902) 429-8300

1. Removal of manganese from Wabush iron ores.	12

Dr. F.A. Jerabek, Associate Professor,
Tel: (902) 429-8300

1. Rock bolt for low seams.	10
2. Sealing of curb ring against the shaft walls.	5 , 6
3. Narrow vein mining : conceptual design of new stoping method and mechanization of stoping operations.	5 , 7

Dr. D.S. Jones, Associate Professor.
Tel: (902) 429-8300

1. Investigate the use of Nova Scotia produced anhydrite as a monolithic mine support pack material in coal mines. 10

2. Plate bearing test investigations on floor material at the Lingan Mine of the Cape Breton Development Corporation, Nova Scotia. 10

Dr. M.C. Rockwell, Associate Professor.
Tel: (902) 429-8300

1. Investigation of the characteristics and properties of Nova Scotia oil shales. 2

B.C. Research,
Occupational Health Group,
3650, Wesbrook Mall,
VANCOUVER, BC,
V6S 2L2

E.C. McDonald,
Program Leader,
(604) 224-4331

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Measurement of airborne dust concentrations and particle size fractions using area and personal sampling devices.	1 , 9
2. Determination of on-site (field) gas concentrations using sensitive continuous monitoring techniques.	1 , 9
3. Presentation of education workshops on chemical handling, industrial hygiene and toxicology.	1 , 9
4. Assistance on selection of respiratory protective devices and the impletmentation and administration of a respiratory protection program.	1 , 9
5. Identification and size-fraction counting of biological contaminants, such as moulds and bacteria, in the workplace atmosphere.	1 , 9
6. Measurement of the permeability of protective clothing to gases, vapours and liquids.	1 , 9
7. Identification of unknown gas reaction by-products and process emissions, by gas chromatography and mass spectrometry.	1 , 9
8. Ergonomic assessment of work procedures, materials handling and equipment design.	8 , 5

Manitoba Telephone Systems,
MOBILE,
P.O. Box 6666,
1300 Ellice Avenue (CB19),
WINNIPEG, MB,
R3C 3V6

Dave C. Sloane,
Engineering Services Manager,
(204) 786-8933

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Underground handset communications system.	1

AISCO Inc.,
3264 Mainway,
BURLINGTON, ON,
L7R 3Y5

T.M. Hopkins,
General Manager,
(416) 335-0002

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Underground run-of-mine ore conveying system; linking four ore passes to the gyratory crusher installation.	5 , 8
2. Development of down-the-hole drill (DTH) complete with computer controls and vision inspection system.	5 , 11

Mines Accident Prevention
Association of Ontario,
147 McIntyre Street W.,
P.O. Box 1468,
NORTH BAY, ON,
P1B 8K6

W. Coughlan,
Executive Director, MAPAO,
(705) 472-4140

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Guidelines for underground rail haulage.	5 , 8
2. Loose rock detection devices.	10
3. Vibration dampening on hand held pneumatic rock drilling machines.	5
4. Backfill quality control in underground mining.	8 , 10
5. Establish a Canadian standard for rockbolts based on ASTM-F432-83	10

Mining Industry Research,
Organization of Canada,
Suite 2550,
P.O. Box 77,
Toronto Dominion Centre,
TORONTO, ON,
M5K 1E7

R.D. Lord,
Research Director, MIROC,
(416) 862-1417

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Successfully tested air flow helmet (featuring dust protection).	1 , 5
2. Miner's worksuit made with a comfortable water-resistant fabric.	1
3. New lightweight and highly protective workboot.	1
4. Development of equipment (hand held drills) with built-in protection against vibration.	5
5. Development of rock stress monitoring devices/equipment.	10 , 11
6. Development of cable bolt grouting equipment.	5 , 10
7. Development of ANFO loading equipment.	5 , 7
8. Investigation of pneumatic transfer/transportation of ANFO.	5 , 7
9. Development of procedures/devices to remove hangups in ore and waste passes and draw points.	7, 8
10. Investigation into dust control associated with dry drilling operations.	5 , 7
11. Evaluation of non-electric primers/detonators.	7

Mining Research Directorate,
F523, Laurentian University,
Ramsey Lake Road,
SUDBURY, ON,
P3E 2C6

Charles B. Graham,
Managing Director, MRD,
(705) 673-6595

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Portable bulkhead designs for backfill programs.	10
2. Catalogue of software applicable to rock mechanics problems.	11 , 10
3. Stope redevelopment through stabilized fill.	6 , 10
4. State-of-the-art review of geophysics applicable to underground hardrock mining.	10 , 3
5. Improved convergence meters.	3 , 10
6. Ground support techniques for protection against moderate rockburst activity.	10
7. Agglomeration of tailings slimes for use as backfill material.	10
8. Quality determination of installed ground support materials.	10
9. Stope design based on stability graph techniques.	10

Mining Resource Engineering Ltd.,
1555 Sydenham Road, RR#8,
KINGSTON, ON,
K7L 4V4

Dr. W.A. Crosby,
President, MREL,
(613) 545-0466

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Theoretical model for predicting low velocity impact sensitivity bubble of sensitized slurry explosion.	7 , 11
2. Development of improved quantity-distance storage requirements for propellants.	11

J.S. Redpath Limited,
P.O. Box 810,
710 McKeown Avenue,
NORTH BAY, ON,
P1B 8K1

W.K. Seidler,
Vice President, Engineering,
(705) 474-2461

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Redpath/Robbins shaft boring machine for boring shafts of 6 m to 7.3 m diameter.	6 , 5
2. Tunnel boring machine for boring tunnels of 2 m to 2.5 m diameter.	6 , 5
3. Winder-tensioner device for installing and tensioning hoist ropes.	5 , 9
4. Self dumping cross-head for shaft sinking.	5
5. Full face sinking of small diameter shafts.	4 , 9
6. Cost study of long-term ground control using rockbolts. Project in conjunction with the Geomechanics Research Centre - Laurentian University.	10

Strata Engineering Corp.,
170 Donway West,
Suite 410,
DON MILLS, ON,
M3C 2G3

Cameran Mirza,
Principal,
(416) 441-2560

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Recovery of surface crown pillar at Les Mines Selbaie using a control caving method.	10 , 11
2. Review and evaluation of strata reinforcement techniques combined with overcoring methods, to determine the in situ stress regimes in coal and weak coal measures/strata/seams.	10 , 5

Teledyne Canada Mining Products,
35 Elgin Street North,
P.O. Box 130,
THORNBURY, ON,
N0H 2P0

Dave Pal,
President,
(519) 599-2015

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1.	Teledyne cogemacoustic ventilation fans.	9
2.	DS-25 mobile scaler, a diesel powered unit mounted on the chassis of an underground service vehicle.	5 , 7
3.	Teledyne loadrite, a transducer measures the variances in hydraulic pressure with an empty bucket and a full bucket, and a computer calculates the weight of the load.	7 , 11
4.	Design and development of a high output, hydraulically operated, mobile, secondary rock breaker (model TM17).	5

Vadeko International Inc.,
6535 Mill Creek Drive,
Unit 62,
MISSISSAUGA, ON,
L5N 2M2

Z. Hershtal,
Vice President,
(416) 821-3222

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development, construction and testing of prototype accessories for automation of DTH drills.	5 , 11

Association des mines de
métaux du Québec,
2, Place Québec,
Suite 704,
QUÉBEC, PQ,
G1R 2B5

Dr. C. Drouin,
Directeur général,
(418) 525-4706

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design of crown pillars.	4 , 10
2. Influence des facteurs organisationnels sur la sécurité du travail.	1
3. Impact de divers paramètres quantifiables sur la productivité en souterrain.	1
4. Procédures de boulonnage. Travail de transfert technologique en cours.	10
5. Étude de l'impact des lois sur la santé et la sécurité du travail et la fréquence des réclamations à la CSST.	1
6. Recherche sur l'exploitation en souterrain des gisements filoniens.	6, 7
7. Participation aux travaux de MITEC dans le Centre canadien d'automatisation et de robotique minières (CCARM).	5, 11

Dux Machinery Corporation,
615, rue Lavoisier,
REPENTIGNY, PQ,
J6A 2E3

Hermann K. Bumueller,
Président,
(514) 581-8341

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design and development of low profile teledump trucks for use in low headings in underground mines.	5 , 8
2. Design and development of air-track drill equipped with a high speed valveless pneumatic rock drill.	5 , 7

Machines Roger International Inc.,
C.P. 818,
2200 Boulevard Industriel,
VAL D'OR, PQ,
J9P 4P8

Roger Massé,
Président,
(819) 825-4657

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Recherche et développement d'une machine de minage en continu, version horizontale.	5 , 11

Lucien Grenier, Vice-Président.
Tel: (819) 825-4657

1. Plus de recherche et développement d'une machine d'excavation continue, modèle vertical.	7 , 11

Noranda Inc.,
Centre de Recherche Noranda,
Division de technologie minière,
240, boulevard Hymus,
POINTE-CLAIRE, PQ,
H9R 1G5

J.H. Nantel,
Gérant,
(514) 697-6640

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Optimization of underground stope blast design.	4 , 7
2. Final stage of the development and testing of an ultrasonic survey probe for determining the contours of inaccessible open stopes or other mine openings.	9 , 11
3. Development of novel ground monitoring instrumentation; recoverable stressmeter, holographic stressmeter and closure meter.	10 , 11
4. Development of a rock mechanics ground control field data database for use in mine design and modelling techniques.	10
5. Construction of state-of-the-art microseismic system.	10 , 11
6. Conduct subsidence studies in potash mining areas.	3 , 10
7. Backfill studies of potash mines.	10
8. Development of a continuous mining machine for hard rock formations.	5 , 11
9. Develop numerical modelling for mine design; primarily finite element and boundary element techniques will be used.	10 , 11
10. Ground support optimization using cable support techniques for stabilizing mining excavations. Laboratory work backed by field applications.	4 , 10
11. Development of commercially viable instrumentation and/or computer systems for full wave microseismic source location and blast vibration monitoring.	10 , 11

12. To review hard materials and novel processes suitable for application in hard rock cutting and mining. 5 , 11

13. Mine electrification. 5 , 9

14. Remote control and guidance system that would permit the operation of mining equipment beyond the visual range of the operator. 5 , 11

15. Automation of bucket loading cycle for LHD equipment. 5 , 11

16. Development of a portable blasthole survey instrument. 5 , 11

17. Investigation of the Kaiser Effect for the determination of in situ rock/ground stresses using drill core samples. 10 , 11

18. Development of a 3-D mine modelling program. 10 , 11

19. Development of automatic guidance systems for LHD equipment and off-highway trucks. 5 , 11

20. Installation and centralized monitoring of microseismic systems installed at operating mines in central and eastern Canada. 10 , 11

21. Transfer of geomechanical stope design (dimensioning) technologies between the research centre and the field operations. 10 , 11

22. Rock joint strength determination using photographic techniques. 10 , 11

23. Development of a portable OTDR convergence meter for use in mine development operations. 4 , 11

24. Field testing of 3-D stressmeter recently developed to be recoverable from field located situations. 11

25. Development of the use of computer vision technology to operate captive (stationary) rock breakers, eg. at an underground grizzly. 5 , 11

British Columbia Ministry of
Energy, Mines & Petroleum Resources,
Parliament Buildings,
VICTORIA, BC,
V8V 1X4

T.G. Carter,
Senior Mechanical/Electrical
Inspector,
(604) 356-2197

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation of non-asbestos brake linings used on large off-highway, surface haul trucks.	5 , 1

R.F. King, Electrical Inspector of Mines.
Tel: (604) 356-2197

1. Safe grounding of portable electrical substations.	5 , 1

Dave Turner, Inspector of Mines - Resident Engineer.
1652 Quinn Street,
PRINCE GEORGE, BC,
V2N 1X3
Tel:(604) 565-6125

1. Causes and alleviation of coal dust problems associated with coal transportation in low climatic temperatures.	1 , 8

Alberta Office of Coal
Research and Technology,
Pacific Plaza, 2nd Floor,
10909 Jasper Avenue,
EDMONTON, AB,
T5J 3M8

R.D. McDonald,
Chairman,
(403) 427-8042

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Capture (extraction) of more detailed geotechnical and hydro-geological information from existing borehole logs by using data processing software developed for this purpose.	3
2. Deformation and progressive failure of high walls in open pits.	10

Alberta Research Council,
Terrain Sciences Department,
P.O. Box 8330,
Station F,
EDMONTON, AB,
T6H 5X2

Dr. Mark M. Fenton,
Manager, Land Resources Research,
(403) 438-7555

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. High wall stability in plains type open pit coal mines.	2 , 10

CANMET, Coal Research Laboratories,
Surface Mining Laboratory,
P.O. Bag 1280
DEVON, AB,
T0C 1E0

D.Bruce Stewart
Manager, Mining Research
(403) 987-8238

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Operations research for surface coal and oil sands mines. (time studies, computer simulation, equipment performance, computerized control technology etc.)	3 , 4
2. Equipment selection and new technologies for surface coal and oil sands mining. (blast casting, in-pit crushing/conveying, continuous mining equipment etc.).	4 , 5
3. Geotechnical engineering for surface coal and oil sands mines (pit walls, dumps, tailings dams etc.).	3 , 10
4. Spontaneous combustion evaluation and control technologies for coal and coal products during mining, processing, transportation and storage.	3 , 8
5. In situ oil sands recovery, including underground access technology.	4 , 12

Manitoba Department of Energy and Mines,
Mines Branch,
555-330 Graham Avenue,
WINNIPEG, MB,
R3C 4E3

D.C. Cook,
Project Coordinator,
(204) 945-0491

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Overburden stabilization.	3
2. Secondary recovery of base metals by in situ bacterial leaching.	12
3. Evaluation of non-destructive testing of hoisting rope.	1 , 5

Saskatchewan Research Council,
15 Innovation Blvd.,
SASKATOON, SK,
S7N 2X8

Dave Eyre,
Manager, Engineering Services
Program,
(306) 933-8245

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design, development and manufacture of customised rock mechanics instrumentation for use in potash mines.	10 , 5
2. Large sample triaxial creep testing facility.	10
3. Research in slurry pipeline technology including coal/crude oil slurry, emulsions and de-watered lignite.	8 , 5

Atomic Energy Control Board,
Health & Environmental Effects Section,
Research & Radiation Protection Branch,
Martel Building,
270, Albert Street,
OTTAWA, ON,
K1P 5S9

Dr. Harold Stocker,
Chief, Health & Environmental
Effects Section,
(613) 995-2866

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Summary of research projects being undertaken by the Research and Radiation Protection Branch of AECB, but not listed hereunder.	1
Dr. M. Rao Avadhanula, Research Scientist. Tel: (613) 995-2618	
1. Remeasurement of Th-230 in the pore water of the Lacnor tailings.	1 , 12
2. Calibration/validation of FEMWATER/FEMWASTE on the Nordic mine site.	1 , 12
Dr. P.J. Duport, Research Scientist. Tel: (613) 995-2896	
1. Comparison of techniques used in estimating past exposures to radon daughters in Canadian mines.	1
2. Determine radon and thoron fluxes in Ontario and Saskatchewan mines to validate the VENTRAD mine ventilation network program.	1 , 9
3. Modified Personal Alpha Dosimeter for Canadian miners.	1
4. Technical evaluation of Instant Working Level meter.	1 , 5
5. Influence of tracer gases on the mobility of radon daughters.	1 , 9
6. Tracer gas method for assessing ventilation efficiency.	9

Dr. D.J. Martin, Research Scientist.
Tel: (613) 995-2768

1. Optimization in the decommissioning of uranium tailings. 1 , 12

Dr. J.L. Wallach, Research Scientist.
Tel: (613) 995-2509

1. Study and evaluation of the implications of waste management of concentrating the slimes of uranium and non uraniun tailings. 3 , 12
2. Study of the natural erosion of surface and near-surface disposal facilities. 1 , 12
3. Study of the methodologies used for estimating the probability of radionuclide intrusion through engineered barriers used in the disposal of low level nuclear wastes. 1 , 12

CANMET, Mining Research Laboratories,
Energy, Mines and Resources,
555 Booth Street,
OTTAWA, ON,
K1A 0G1

Dr. J. Udd,
Director MRL,
(613) 996-8603

CANMET, IN-HOUSE RESEARCH/RECHERCHE INTERNE.

Elliot Lake Laboratory/Laboratoire d'Elliot Lake

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Investigating mine stability and rockburst activity in mines and the study of the effect on computer models of alternate mine layout and extraction rates.	4 , 10
2. Evaluation of the quality and quantity of respirable dust produced in various selected mining activities.	1 , 9
3. Identification of major sources of radiation and the factors affecting the release of radiation in mines; study of methods to control radiation emanations.	1 , 9
4. Developing methods to treat, dispose of and stabilize inactive tailings piles.	3
5. Evaluation of pillar stability on a local and regional scale in Canadian hardrock mines, and determination of pre-mining stresses in rockburst-prone mines.	1 , 10
6. Develop new seismic equipment and monitoring techniques for studying rockbursts in hardrock mines, and undertake seismic studies.	10 , 11
7. Combined study of radiation, dust and ventilation in underground mines.	1 , 9
8. Revision of CANMET-MRL research reports on noise and vibration to publish an up-to-date literature survey of MRL work in this field.	1

Sudbury Laboratory/Laboratoire de Sudbury

1.	Establishment of MRL's Backfill laboratory on the campus of Laurentian University in Sudbury.	3 , 10
2.	Installation, calibration and commissioning of equipment at MRL's backfill laboratory in Sudbury.	3 , 10
3.	Review of laboratory and in situ testing methods for establishing the physical and engineering properties of mine backfill materials.	3 , 10

Canadian Explosives Atmospheres Laboratory
Laboratoire canadien sur les atmosphères explosives

1.	Certification of explosion-proof equipment, fire-resistant materials, and gas detection instruments. Technical information and certification service.	1
2.	Transfer and privatization of diesel emission control technology	1 , 5
3.	Monitoring the continuing compliance of apparatus and materials certified by EMR, and maintaining a certification history of EMR certified products.	1
4.	Participation in the development of standards related to the certification of apparatus and materials for use in gassy mines.	1 , 5
5.	Investigation and study of sulphide ore dust explosions.	1 , 8
6.	Characterization of coal dust explosibility	1 , 8
7.	Development of laboratory facilities for studying dust and gas explosions.	1
8.	Research and development of alternate ceramic filter materials suitable for diesel emission control units.	1 , 5
9.	Development of a facility to study automated data collection and vehicle cycle simulation for diesel engines.	1

10. Collection and compilation of historical data on wire rope examination and testing. Pertaining particularly to hoisting equipment. 1 , 8

11. Study of automated control of ventilation systems in Ontario mines. 9

12. Underground field studies to assess air quality in Canadian mines; associated with the AQI studies. 1 , 9

Canadian Explosives Research Laboratory
Laboratoire canadien de technologie sur les explosifs

1. Confirm safety characteristics of all explosives; provide technical advice on explosive manufacture, storage and transportation, and investigate accidents. 1

2. Verification of proposed United Nations classification procedures for incorporation into the Explosives Act and Regulations of Canada. 1

Canadian Mine Technology Laboratory
Laboratoire canadien de technologie minière

1. Developing rock bolting guidelines based on the latest technological data and analytical results. 10

2. Carry out analytical numerical modelling studies as part of applied ground control investigations - Numerical Modelling Group. 10 , 11

3. Developing field and laboratory methods, equipment and procedures to assess the suitability of rock formations for high level radioactive waste containment. 3

4. Develop new ore reserve evaluation methodologies. 3

5. Supporting research to increase potash recoveries. 4 , 10

6. Maintaining a database of information on current and developing mining technology. 1 , 9

7. Developing a handbook for the safe and economic design of surface crown pillars. 4 , 10

8. Integration of ore blending requirements with haulage automation at a specified open pit mine. 3

9. Establish the strength, deformational characteristics and other physical properties of rock types encountered in rock mechanics research investigations. 10

10. Evaluation of rock mass stability for surface crown pillars. 10

11. Develop new rock mechanics tests and test procedures. 3 , 10

12. Establish data bank on peak and residual rock strengths and other physical properties of rocks commonly encountered in Canadian mining operations. 3 , 10

13. Development of a reliable high resolution radial monitoring device for recording changes in borehole diameter due to stress during mining. 3 , 5

14. Calculation of ore reserves for specific types of mineral deposits (service charges). 2 , 3

CANMET, CONTRACT RESEARCH/RECHERCHE CONTRACTUELLE

1. Regional subsidence related to potash mining operations.
   (Central Canada Potash) 10

2. Determination of the PAH partition ratio and nature of mutagens generated by catalytic purifiers.
   (Laurentian University) 11

3. Rock mass characterization and retro-analyses of existing and failed surface crown pillars in hard rock mines.
   (Golder Associates) 10

4. Determination of mechanical and structural properties or characteristics of surface crown pillars.
   (Trow Associates) 10 , 3

5. Seismic characterization of discontinuities and anomalous rock faults in surface crown pillars using alteration and velocity imaging.
   (Queen's University) 10 , 3

6. Recovery of surface crown pillar overlain by 40m of overburden at Les Mines Selbaie using a controlled caving method of mining.
   (Les Mines Selbaie) 3 , 10

7. Study and evaluation of sulphide dust/SO2 monitoring systems.
   (Noranda Research) 1 , 9

8. Study of the fundamentals of coal dust explosions.
   (McGill University) 1

9. Study of the effect of scale on dust explosions.
   (AECL, Whiteshell Laboratory) 1

10. Study of methane/coal dust explosions.
    (Technical University of NS) 1

11. Study and evaluation of CO2 as a surrogate for all diesel pollutants in the mine atmosphere.
    (Noranda Research/Brunswick Mine) 1 , 9

12.	Evaluation of the impact of animal studies on mine ventilation. (I.W.French)	1 , 9
13.	Study and assessment of equipment and apparatus for the non-destructive testing of wire ropes, particularly mine hoist ropes. (L.Geller)	9 , 5
14.	Development of a 3-D computer software system for open pit and underground mine planning and design. (Lynx Canada Expl. Ltd.)	2 , 11

Mineral Development Agreements.

Mineral Development Agreements (MDAs) are contractual agreements made between the federal government, provincial governments and mining companies, to suppport regional development in specified regions of Canada. The jointly funded R&D projects help the industry become more competitive by increasing productivity through improved health and safety, accelerated technological change, and an overall improvement in operational efficiency.

Since 1984, the federal government has committed a total of $6,847,200 to MDAs signed with four provinces; of which $6,257,000 will have been spent by the end of the fiscal year 1988-89 ,including $1,367,200 in the current fiscal year. These MDAs are now beginning to expire, and will totally have done so by the end of 1991. Negociations for renewal, and the initiation of totally new MDAs, are in progress.

Ententes fédérale-provinciales

Les ententes pour le développement des minéraux constituent des projets conjoints du fédéral, des provinces et des sociétés minières, afin d'encourager le développement des ressources minérales de régions particulières du Canada. Les projets conjoints de R&D contribuent à la compétitivité des entreprises par un accroissement de productivité dû soit à de meilleures conditions de salubrité et sécurité, soit à des changements technologiques, qui en augmentent l'efficacité operationnelle globale.

Depuis 1984, le gouvernement fédéral a conclu avec quatre provinces des ententes qui contiennent un volet en technologie minière d'une valeur totale de 6 847 200$. A la fin de la présente année fiscale, un total de 6 257 000$ aura été dépensé, dont 1 357 200$ dans l'année courante. Ces ententes arrivent à terme et seront totalement expirées en 1990-1991. Des négociations pour les renouveler et en créer de nouvelles sont présentement en cours.

Ontario Ministry of Labour,
Mining Health and Saftey Branch,
OH&S Division,
260 Cedar Street,
SUDBURY, ON,
P3B 3X2

J.J. Lazurko,
Chief Engineer - Technical,
(705) 675-4468

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Joint CANMET/Ontario MOL/Industry rockburst research program.	10
2. Wire rope and hoisting technology. CANMET/Ontario MOL/USBM joint project.	5 , 9
3. Diesel emissions in underground US mines. Ontario MOL/USBM joint project.	5 , 1
4. Evaluation of non-destructive testing device for mine shaft wire ropes. CANMET/Ontario MOL/USBM joint project.	9
5. Design and evaluation of mine shaft loading pockets - phase 2.	8
6. Promotion of the Crisis Management Program (CRIMP) mine safety program(s).	1 , 3

Centre de Recherches Minérales,
Ministère de l'Énergie
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2700, rue Einstein,
SAINTE-FOY, PQ,
G1P 3W8

Jean-Marc Robert,
Adjoint au chef du STM.,
(418) 643-4504

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Les propriétés physiques et mécanique des remblais souterrains et leur influence sur la conception des chantiers souterrains.	4 , 10
2. Logiciels de modélisation numérique pour le calcul des contraintes autour des excavations.	10 , 11
3. Développement d'un système de planification par graphisme interactif à 3-D.	4 , 11
4. État sommaire de la question sur la mesure des déplacements par extensomètres.	10
5. Développement d'un système de contrôle à distance sans vision directe de l'opérateur.	9 , 11
6. Mise en service, vérification et études techniques des machines d'extraction.	9
7. Guide des techniques d'évalution des gisements d'or.	3
8. Répertoire des équipements miniers dans le monde.	5
9. Étude de la fatigue des câbles de machines d'extraction.	9
10. Quantifier l'influence du tensionnement après l'injection sur les câbles cimentés, pour déterminer le temps maximal que l'on peut prendre pour les tensionner.	5 , 10
11. Développement d'un système de modélisation d'un gisement minier.	3 , 11

12.	Évaluation complète du logiciel PC-XPLOR	3 , 11
13.	Systèmes experts - Travaux de recherches et développement d'un prototype.	11
14.	Développement de l'usage de l'hydrogène comme carburant aux equipments miniers.	5
15.	Étude et réalisation de plans électriques pour l'industrie minière.	5 , 9
16.	La recherche sur l'influence de diverses variables, dont la prime au rendement, sur la productivité souterraine.	7 , 2
17.	Inventaire des méthodes d'exploitation minière au Québec.	2 , 6

CANMET, Coal Research Laboratories,
Cape Breton Coal Research Laboratory,
210 George Street,
SYDNEY, NS,
B1P 1J3

G.A. Haslett,
Group Leader,
(902) 564-7673

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Subsidence in mining areas.	10
2. Methane prediction and control in underground coal mines.	4 , 9
3. Airborne dust control in collieries.	4 , 9
4. Ventilation performance and control in underground coal mines.	4 , 9
5. Water-jet assisted cutting of medium strength rocks.	5 , 11
6. Evaluation of roadway/gateroad passive support packs.	10
7. Roadway/ gateroad support systems to facilitate dual life for roadways.	10
8. Rockbolting systems for roadway/gateway support.	10
9. Main roadway intersection support systems.	10

New Brunswick Occupational Health
and Safety Commission,
P.O. Box 6000,
500 Beaverbrook Court
FREDERICTON, NB,
E3B 5H1

K.E. Daniel,
Manager, Mine Safety,
(506) 453-2467

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation of non-destructive hoist rope testing equipment.	5 , 9

Research & Productivity Council,
P.O. Box 6000,
FREDERICTON, NB,
E3B 5H1

D. Abbot,
Manager R&D,
(506) 452-8994

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
L. Danisch, Head Electronics Divison. Tel: (506) 452-8994.	
1. Maximization of dragline operations by developing expert systems to monitor operating parameters.	5, 11
D.B. Mitchell, Head Engineering Materials. Tel: (506) 452-8994.	
1. Application of vibration analysis in the preventative maintenance programs for heavy mobile equipment.	5

SECTION 2

Projects Listed by Categories

Liste des projets par catégorie

MINE INDEX CATEGORIES

1. ADMINISTRATION : Mine Administration includes manpower training and development, health and safety of employees, management organization, voice communication, data communication, remote monitoring and labour relations.

2. FEASIBILITY : Mine Feasibility includes economic studies, mine evaluations, cost estimations and other projects undertaken to determine the potential success of major capital expenditures to develop a new mine, rehabilitate an old mine or expand an existing mine for increased production or better productivities.

3. SURFACE TECHNOLOGY : Surface Technology includes prospection, exploration,

sampling, modelling, geostatistics, hydrology and geotechnology. It will also include projects dealing with environmental subjects, waste management, dewatering and other site work such as roads, bridges, damns and runways.

4. DESIGN : Mine Design includes selecting stope and pillar patterns and mining methods for new mines or for existing operations that are to be modernized or expanded. The category also includes planning, scheduling and grade control.

5. EQUIPMENT : Equipment includes equipment design, selection and maintenance as well as installed and consumable supplies.

6. DEVELOPMENT : Development includes methods of advancing mine and stope access headings leading to the fragmentation and removal of the muck to the haulage system.

7. PRODUCTION : Stoping includes operational topics such as fragmentation, blast pattern design, drilling methods, explosives and all other matters connected to preparing a block of ore, either a stope or a pillar, for drilling and blasting and removal of the fragments to the haulage system.

8. MATERIALS HANDLING : Materials Handling includes the movement of fragmented material, from stope or development heading, via loading/transportation systems, grizzlies, rock-breakers, ore passes, crushers, surge and storage bins and loading pockets to surface.

9. SERVICES : Mine Services include ventilation, surveying, compressed air, dewatering systems, air heating, hoisting plant (hoist, headframe, shaft conveyances and all shaft installations) and electrical supply, control and distribution.

10. GROUND CONTROL : Ground Control includes rock mechanic studies, ground support mechanisms and ground support preparation, placement and installation.

11. HIGH TECH : High Tech includes computers, robotics, water jets or other new and innovative topics.

12. PROCESSING : Processing includes general milling operations, mill recoveries, concentrate grades, reagent consumption etc. as well as in-situ and heap leaching operations on surface or underground, and recovering economic values from tailings and waste dumps.

CATÉGORIES DU RÉPERTOIRE

1. ADMINISTRATION : Inclut l'entraînement du personnel, santé et sécurité des employés, communications orales, transmission de données et relations de travail.

2. FAISABILITÉ : Comprend les études économiques, évaluation minière, estimation des coûts et autres projets entrepris afin de déterminer le succès potentiel d'un investissement majeur pour développer un nouveau gîte, réouvrir une ancienne mine ou l'expansion d'une mine déjà existante afin d'accroître la production ou la productivité.

3. TECHNOLOGIE DE SURFACE : Prospection, exploration, échantillonnage, modélisation, géostatistique, hydrologie et géotechnologie. Comprend également les projets touchant l'environnement, disposition des résidus miniers, drainage et autres travaux de surface tels: routes d'accès au site, ponts et digues.

4. CONCEPTION : Inclut la configuration des chantiers et piliers et les méthodes de minage pour des nouvelles mines ou pour des opérations à moderniser ou expansionner. Cette catégorie inclut en plus les activités de planification, cédulation et ajustement des teneurs.

5. ÉQUIPEMENT : Inclut la conception, la sélection et l'entretien d'équipement mobile ou stationnaire et pièces.

6. DÉVELOPPEMENT : Méthodes de développement des accès dans la mine et aux chantiers, et moyens de briser et évacuer la roche dans le système de halage.

7. PRODUCTION : Inclut les opérations de minage telles: fragmentation, conception de patrons de sautage, méthodes de forage, explosifs et autres opérations reliées à la préparation d'un bloc de minerai pour forage, sautage et manutention du matériel dans le système de halage.

8. MANUTENTION DES MATÉRIAUX : Inclut le mouvement du roc fragmenté à partir des chantiers ou ouvrages de développement, via systèmes de transport/chargement, grizzlis, marteaux pneumatiques, cheminées à minerai, concasseurs, silos à minerai et points de soutirage jusqu'en surface.

9. SERVICES : Ventilation, arpentage, air comprimé, système de drainage, chauffage de l'air, chambre de treuil (treuil, chevalement, installations du puits), système de distribution et contrôle électrique.

10. SOUTÈNEMENT: Inclut les études en mécanique des roches, soutènement minier, préparation au soutènement et installation du soutènement.

11. TECHNOLOGIE DE POINTE : Inclut l'utilisation des ordinateurs, la robotique ainsi que tout autre sujet d'innovation.

12. MINÉRALURGIE : Inclut le traitement en général: récupération, teneur des concentrés, consommation de réactifs, etc. Comprend également la lixiviation en place ou en tas à la surface ou en souterrain, de même que la récupération de valeurs économiques contenues dans les haldes de stériles et bassins de résidus.

1. ADMINISTRATION

PROJECT TITLE TITRE DU PROJET	PAGE
1. Measurement of airborne dust concentrations and particle size fractions using area and personal sampling devices.	101
2. Measurement of the permeability of protective clothing to gases, vapours and liquids.	101
3. Identification of unknown gas reaction by-products and process emissions by gas chromatography and mass spectrometry.	101
4. Assistance on selection of respiratory protective devices and the implementation and administration of a respiratory protection program.	101
5. Identification and size-fraction counting of biological contaminants, such as mould and bacteria, in the workplace atmosphere.	101
6. Presentation of education workshops on chemical handling, industrial hygiene and toxicology.	101
7. Determination of on-site (field) gas concentrations using sensitive continuous monitoring techniques.	101
8. Evaluation of haulroad dust control and dust abatement alternatives.	13
9. Development of PNET program for project scheduling.	71
10. Examination of sulphide dust explosions in Canadian mines.	70
11. Development of mine-wide computer database system.	12
12. Evaluation of non-destructive testing of hoisting rope.	121
13. Monitoring the continuing compliance of apparatus and materials certified by EMR, and maintaining a certification history of EMR certified products.	126

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PAGE

14. Development of a facility to study automated data collection and vehicle cycle simulation for diesel engines. 126

15. Verification of proposed United Nations classification procedures for incorporation into the Explosives Act and Regulations of Canada. 127

16. Confirm safety characteristics of all explosives; provide technical advice on explosive manufacture, storage and transportation; and investigate accidents. 127

17. Development of laboratory facilities for studying dust and gas explosions. 126

18. Certification of explosion-proof equipment, fire-resistant materials, and gas detection instruments. Technical information and certification service. 126

19. Revision of CANMET-MRL research reports on noise and vibration to publish an up-to-date literature survey of MRL work in this field. 125

20. Participation in the development of standards related to the certification of apparatus and materials for use in gassy mines. 126

21. Transfer and privatization of diesel emission control technology 126

22. Research and development of alternate ceramic filter materials suitable for diesel emission control units. 126

23. Collection and compilation of historical data on wire rope examination and testing; pertaining particularly to hoisting equipment. 126

24. Characterization of coal dust explosibility 126

25. Investigation and study of sulphide ore dust explosions. 126

26. Evaluation of the quality and quantity of respirable dust produced in various selected mining activities. 125

PROJECT TITLE
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	PAGE
27. Identification of major sources of radiation and the factors affecting the release of radiation in mines; study of methods to control radiation emanations.	125
28. Maintaining a database of information on current and developing mining technology.	127
29. Underground field studies to assess air quality in Canadian mines; associated with the AQI studies.	127
30. Combined study of radiation, dust and ventilation in underground mines.	125
31. Evaluation of pillar stability on a local and regional scale in Canadian hardrock mines, and determination of pre-mining stresses in rockburst-prone mines.	125
32. Study of the fundamentals of coal dust explosions (McGill University).	129
33. Study of methane/coal dust explosions (Technical University of NS).	129
34. Study of the effect of scale on dust explosions (AECL Whiteshell Laboratory).	129
35. Study and evaluation of sulphide dust/SO2 monitoring systems (Noranda Research).	129
36. Study and evaluation of CO2 as a surrogate for all diesel pollutants in the mine atmosphere (Noranda Research/Brunswick Mine).	129
37. Evaluation of the impact of animal studies on mine ventilation (I.W.French).	130
38. Remote monitoring and analysis of energy management systems.	31

PROJECT TITLE
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39. Development of a computerised system to perform month-end survey calculations for mine reporting and incentive/bonus schemes. 31

40. Underground radio communications. 48

41. Phase II of a project to improve underground communications. 37

42. New lightweight and highly protective workboot. 105

43. Miner's worksuit made with a comfortable water-resistant fabric. 105

44. Successfully tested air flow helmet (featuring dust protection). 105

45. Experience with a remote fly-in mining operation. 45

46. Promotion of the Crisis Management Program (CRIMP) mine safety program(s). 132

47. Diesel emissions in underground U.S. mines. Ontario MOL/USBM joint project. 132

48. Modélisation de la productivité d'une machine seule, de l'interaction homme-machine et d'un système de machines. 90

49. Remote surveillance of mine plant entrances. 49

50. Développement de grades d'amiante chrysotile de remplacement. 50

51. Communication systems for underground workers. 64

52. Impact de divers paramètres quantifiables sur la productivité en souterrain. 112

53. Étude de l'impact des lois sur la santé et la sécurité du travail et la fréquence des réclamations à la CSST. 112

PROJECT TITLE
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54. Influence des facteurs organisationnels sur la sécurité du travail. 112

55. Install and commission u/g radio communications system 39

56. Test automated blast vibration monitoring equipment 39

57. Communication system for isolated areas in underground mines. 22

58. Study of sulphide dust explosions in Canadian mines - a fine particle approach. 79

59. White finger. Preliminary study on prevention of Raynauds disease. Joint project with Dr. Lloyd D.Reed. 79

60. Installation and testing of minewide underground radio communication system. 44

61. Underground handset communication system. 102

62. Feasibility study on the optimization of integrative ergonomics for mine safety equipment. 77

63. The lifetimes and pathways of the PAHs and mutagens in dieselized underground mines. (Dr. D. Hallman, assoc. researcher.) 77

64. Determination of the nitro PAHs and mutagens generated by the catalytic converters used on underground diesel equipment. Dr.D. Hallman, assoc. researcher.) 77

65. White Finger (Raynauds) disease. Prevention of theis disease caused by vibration. (joint project with Dr. Debra A. Bakker). 77

66. Evaluation of non-asbestos brake linings used on large off-highway, surface haul trucks. 117

67. Safe grounding of portable electrical substations. 117

PROJECT TITLE
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68. Causes and alleviation of coal dust problems associated with coaltransportation in low climatic temperatures. 117

69. Development of engineering controls for environmental noise attenuation and personal hearing protection. (Lester Kneen, Chief surveyor). 43

70. Study ways and means to attenuate vibration exposure for drill doctors and drill sharpening personnel. (Michael Zaiser, Snr. Contract & Research Eng.) 42

71. Development of computer programs to monitor exposure of workers to various specified environmental toxic pollutants. (Monica Kuntzel, Bonus & Research Tech.) 43

72. Research on causes, effects and prevention of sulphide dust explosions. 42

73. Summary of research projects being undertaken by the Research and Radiation Protection Branch of AECB, but not listed hereunder. 123

74. Comparison of techniques used in estimating past exposures to radon daughters in Canadian mines. 123

75. Modified Personal Alpha Dosimeter for Canadian miners. 123

76. Technical evaluation of Instant Working Level meter. 123

77. Determine radon and thoron fluxes in Ontario and Saskatchewan mines to validate the VENTRAD mine ventilation network program. 123

78. Influence of tracer gases on the mobility of radon daughters. 123

79. Study of the natural erosion of surface and near-surface disposal facilities. 124

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80. Study of the methodologies used for estimating the probability of radionuclide intrusion through engineered barriers used in the disposal of low level nuclear wastes. 124

81. Calibration/validation of FEMWATER/FEMWASTE on the Nordic mine site. 123

82. Re-measurement of Th-230 in the pore water of the Lacnor tailings. 123

83. Optimization in the decommissioning of uranium tailings. 124

2. FEASIBILITY / FAISABILITÉ

PROJECT TITLE TITRE DU PROJET	PAGE
1. DM/Crescent zone mine feasibility studies	7
2. Computer program for estimating capital and operating costs.	70
3. Preliminary geostatistical study, Mascot Gold Mines, Hedley, BC.	71
4. Co-kriging as an aid to reserve estimation of precious metals.	71
5. Geostatistical ore reserve estimation (North Buckhorn deposit, Nevada).	71
6. Economics of mining wollastonite.	71
7. Economics of mining zeolites.	71
8. Open pit simulation studies.	82
9. Computerized open pit feasibility and design.	82
10. Use of total tailings for backfill support.	82
11. Expert system for risk analysis in mine feasibility.	83
12. Calculation of ore reserves for specific types of mineral deposits (service charges).	128
13. Development of a 3-D computer software system for open pit and underground mine planning and design (Lynx Canada Expl. Ltd.).	130
14. Trials and evaluation of fracturing and in situ bacterial leaching of sub marginal uraniun ore, ie. not in ore reserves	48
15. Évaluation des techniques de géostatistique nonparametrique (krigeage de l'indicatrice, krigeage probabiliste.	98

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16. Simulation of mine operating decisions. 92

17. Risk analysis in mining investments. 92

18. Optimization of mine development and operating variables. 92

19. Development of micro computer software to evaluate new mine investment proposals. 92

20. Rehabilitation of old mines. 92

21. Étude de faisabilité d'un rideau d'étanchéité pour réduire les venues d'eau. 49

22. Inventaire des méthodes d'exploitation minière au Québec. 134

23. La recherche sur l'influence de diverses variables, dont la prime au rendement, sur la productivité souterraine. 134

24. Field evolution of tailings abandonment techniques. 85

25. Investigation of the characteristics and properties of Nova Scotia oil shales. 100

26. Critical analysis of the payback period project evaluation criterion. 80

27. Economic evaluation and optimization of mine reconstruction. 80

28. Étude de faisabilité de l'approfondissement de la mine du niveau 500 au niveau 800 62

29. Testing feasibility of replacing post in timbered drifts with cable slings. 38

30. High wall stability in plains type open pit coal mines. 119

31. Rotary breaker reject crushing and feeding to the preparation plant for coal processing. 17

3. SURFACE TECHNOLOGY / TECHNOLOGIE DE SURFACE

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1. Evaluation of various methods of resloping large coal mine waste dumps to allow for final revegetation. 13
2. The long-term use of flow-through rock drains in coal mine waste dumps. 13
3. Evaluation of haulroad dust control and dust abatement alternatives. 13
4. Optimization of raw coal recovery and quality, including reconciliation of past performance 13
5. Complete relocation of Highmont mill complex along 9 km of mine roads using heavy diesel equipment. Major logistics project. 15
6. Cementation of waste rock to effect control of acid mine drainage. 18
7. Sub-aerial tailings deposition. 18
8. Restoration of coal refuse/waste storage sites. 10
9. Overburden stabilization. 121
10. Calculation of ore reserves for specific types of mineral deposits (service charges). 128
11. Developing methods to treat, dispose of and stabilize inactive tailings piles. 125
12. Develop new ore reserve evaluation methodologies 127
13. Developing field and laboratory methods, equipment and procedures to assess the suitability of rock formations for high level radioactive waste containment. 127

PROJECT TITLE TITRE DU PROJET	PAGE
14. Integration of ore blending procedures with haulage automation technology at a specified open pit mine.	127
15. Development of a reliable high resolution radial monitoring device for recording changes in borehole diameter due to stress during mining.	128
16. Review of laboratory and in situ testing methods for establishing the physical and engineering properties of mine backfill materials.	126
17. Installation, calibration and commissioning of equipment at MRLs backfill laboratory in Sudbury.	126
18. Establishment of MRLs backfill laboratory on the campus of Laurentian University in Sudbury.	126
19. Establish data bank on peak and residual rock strengths and other physical properties for rocks commonly encountered in Canadian mining operations.	128
20. Develop new rock mechanics tests and test procedures.	128
21. Recovery of surface crown pillars overlain by 40 m of overburden at Les Mines Selbaie, using a controlled caving method of mining. (Les Mines Selbaie)	129
22. Seismic characterization of discontinuities and anomalous rock faults in surface crown pillars using alteration and velocity imaging (Queen's University).	129
23. Determination of mechanical and structural properties or characteristics of surface crown pillars (Trow Associates).	129
24. Promotion of the Crisis Management Program (CRIMP) mine safety program(s).	132
25. Processes for obtaining environmentally safe uranium mill tailings.	75

PROJECT TITLE
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26. Anisotropie de perméabilité des sols et des roches. 90
27. Évolution des propriétés hydrauliques des agrégats routiers. 90
28. Bilans hydrogéologiques dans un parc à résidus miniers. 90
29. Influence de l'eau de forage sur les mesures de perméabilité. 90
30. Représentativité de la perméabilité obtenue par essais de pompage. 90
31. Influence du scellement sur le niveau d'eau fourni par un piézomètre. 90
32. Intéractions hydrauliques-mécaniques dans les essais de perméabilité en place : essais ponctuels et essais de pompage. 89
33. Blast fragmentation studies. 93
34. Rehabilitation of old mines. 92
35. Study of numerical modelling techniques applicable in mining engineering. 94
36. Plan de la nappe phréatique entourrant le gisement. 49
37. Étude d'évaluation strategique des options de gestion des rejets d'amiante 50
38. Guide des techniques d'évalution des gisements d'or. 133
39. Développement d'un système de modélisation d'un gisement minier. 133
40. Évaluation complète du logiciel PC-XPLOR 134
41. Conduct subsidence studies in potash mining areas. 115
42. Seismicity and geophysical engineering in potash mines. 74

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43. Geostatistical ore reserve modelling for diamond drill and blast hole drill assays with computer graphic and plotter displays. 9

44. Reclamation work on tailings and waste dumps, including re-sloping and seeding. 9

45. Evaluation of the effects of water flowing through surface waste rock dumps/piles. 9

46. Waste management for oil sands mines. 85

47. Reclaimed strip mine subsidence. 85

48. Development of an Expert System for geophysical log interpretation. 85

49. Flow in jointed rock 86

50. Measurement of blast damage 86

51. Field evolution of tailings abandonment techniques. 86

52. Geochemistry of the Vadose zone of the Waite Amulet tailings impoundment. 85

53. Geochemical evolution and the mobility of trace heavy metals at the Heath Steele Mine tailings, New Brunswick. 85

54. Geochemical evolution of the Delnite Mine tailings, Ontario. 85

55. Operations research for surface coal and oil sands mines.(Time studies, computer simulation, equipment performance and computerized control technology.) 120

56. Spontaneous combustion evaluation and control technologies for coal and coal products during mining, processing, transportation and storage. 120

PROJECT TITLE TITRE DU PROJET	PAGE
57. Geotechnical engineering for surface coal and oil sands mines (pit walls, dumps, tailings dams etc.).	120
58. Ensemencement des haldes minières à l'aide des boues d'une usine d'épuration.	87
59. Relevé de vitesse particulaire (vibration), exploitation chantier long trou 6.5 po (162.5 mm) dia. pilier de surface.	63
60. Étude statistique de la distribution des échantillons de minerai (Au) dans les points de soutirage.	63
61. Microcomputer based core logging system.	44
62. Contrôle en continu des valeurs aurifères.	58
63. Tailings reclamation using dredging and dry excavation.	38
64. Removal of high (over 20 m) post-pillars from an existing open room and pillar stoping area (equipment and ground control considerations).	16
65. Large scale heap leaching of low grade gold ore from open pit. The waste residue will be used as mine backfill.	35
66. Capture (extraction) of more detailed geotechnical and hydrogeological information from existing borehole logs by using data processing software developed for this purpose.	118
67. Automated floculation stations located on water courses draining out of the mine property.	17
68. Remote sensing as an aid to mineral exploration in northern terrains.	76
69. Radionuclides in mammals living in drainage systems associated with uranium mine tailings.	76

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70. Monitoring of nitrogen status (concentration) in soils rendered barren by industrial activity and/or revegetated for reclamation purposes. 78

71. Improved convergence meters. 106

72. State-of-the-art review of geophysics appicable to underground hardrock mining. 106

73. Étude de stabilité par caractérisation de la masse rocheuse et modélisation numérique. 60

74. Development of interactive computerized core logging system for rock mechanics applications - ROCKLOG. 27

75. Study and evaluation of the implications of waste management of concentrating the slimes associated with uranium and non uranium tailings. 124

76. Slope optimization in open pit mines. 92

4. DESIGN / CONCEPTION

PROJECT TITLE TITRE DU PROJET	PAGE
1. Design criteria for pillars in coal mines.	72
2. Study of pillar behaviour where burst conditions exist in longwall coal mines. Co-operative project with Pittsburgh Research Centre, USBM.	72
3. Cutter roof failure in coal mines - investigation of theoretical conditions, modelling results and comparing with case histories.	72
4. Design of artificial supports for footwall bedded slopes with particular attention to counteracting the "buckling" failure mode.	72
5. Short range planning model.	13
6. Development of PNET program for project scheduling.	71
7. Coal blending computer model for improved mine planning.	70
8. Development of a file of mine service planning computer models that are compatible with the IBM-PC.	71
9. Application of rock mechanics methods for the design of underground mines.	71
10. The influence of rock mechanics considerations on mine design and short and long term stability.	18
11. Continuation of study to develop better mechanised mining methods for use in low dipping (20 to 40 degs.) pillar recovery mining operations.	12
12. Optimization of blast design for blasthole mining operations. (CAN/MAN. MDA)	24
13. Development of a geomechanical database and numerical model for predicting ground behaviour at depth. (CAN/MAN. MDA)	24

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14. Vertical Blasthole Mining (VBM) design guidelines for steeply dipping ore bodies, hang-up removal and scaling techniques. (CAN/MAN. MDA) 24

15. Mine design CADD system. 24

16. Bacterial-Leach assisted mining. 23

17. Computerized open pit feasibility and design. 82

18. Open pit simulation studies. 82

19. Pit slope stability studies. 82

20. Use of total tailings for backfill support. 82

21. Use of chemical gelling agents as cement replacement materials in backfills. 82

22. Assessment of quality control parameters influencing in situ backfill competence. 82

23. Long term subsidence prediction in potash extraction operations based on field monitoring, laboratory measurements and computer modelling. 82

24. Open pit mine design and production scheduling using microcomputers and CAD systems. 83

25. Continuous materials handling systems - Design and feasibility in medium sized hardrock mines. 83

26. Studies in mine sequencing in deep narrow vein deposits to minimize stress induced ground control problems. 83

27. Assessment of mining methods involving stope re-development (stope pillar recovery) through stabilized backfill 83

PROJECT TITLE
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28. Development and verification of computerized cut and fill panel design 46

29. Developing a handbook for the safe and economic design of surface crown pillars. 127

30. Supporting research to increase potash recoveries. 127

31. Investigating mine stability and rockburst activity in mines, and the study of the effects on computer models of alternate mine layout and extraction rates. 125

32. Computer aided design for optimum mine planning. 33

33. Prévision des effets de l'utilisation des rejets de sel comme matériaux de remblayage sur l'affaisement de surface des mines de sel domal. 89

34. Évaluation du potentiel de coups de toit d'une mine. 89

35. Optimisation des contours des exploitations à ciel ouvert. 90

36. Preparation of a "Technical guide for grouted cable-bolts used as ground support". 97

37. Création d'une station CAO/DAO et intégration dans l'enseignement des techniques. 97

38. Improvement of subroutine DISCO (solving principal stresses along discontinuity planes) to account for progressive failures, blasting effects and spacing/size of discontinuities. 97

39. Optimisation de la planification de la production des mines à ciel ouvert. 98

40. Développement de systèmes experts pour la sélection de l'équipement dans les mines à ciel ouvert. 98

PROJECT TITLE
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41. Expert system development for mine design/control. 91

42. Design techniques for steel support in mine tunnels. 93

43. Design a method of cut-and-fill for post pillar mining. 93

44. Stability of gate roadways in underground coal mines. 93

45. Optimization of underground mine design. 93

46. Computerized open pit design. 93

47. Design and analysis of underground steel support systems. 94

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33. Improving productivities in cut-and-fill stopes through mechanized bolting and scaling. 33

34. Hydraulic hoisting of minus 3 in. screened ore up 2260 ft. at Onaping Mine (HDRK project). 34

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36. Hang-up relief techniques for drawpoints and ore passes. 37

37. Mechanized excavation in consolidated rockfill. 37

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5. Initial study on the introduction of bioleaching methods for the recovery of zinc from remnant pillars and broken ore at the Sullivan mine. 12
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10. Trials for downsizing existing electric hydraulic drills and drill strings to effect more economic use of explosives 48
11. Improving productivities in cut-and-fill stopes through mechanized bolting and scaling. 33
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23. Évaluation des techniques de géostatistique nonparametrique (krigeage de l'indicatrice, krigeage probabiliste. 98

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36. Recherche sur l'exploitation en souterrain des gisements filoniens.	112
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38. Test trials of new underground bulk explosives handling vehicle	39
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40. DS-25 mobile scaler; a diesel powered unit mounted on the chassis of an underground service vehicle.	110
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50.	Plus de recherche et développement d'une machine á l'excavation continu modèle vertical.	114
51.	Longhole mining in narrow veins.	38
52.	Pillar mining at the Polaris mine using frozen backfill. Ongoing search for ways to ensure steady supply of good quality backfill material.	11
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54.	Large scale backhoe applications in multi-seam mining operations.	17
55.	The implementation of a production monitoring and contro, system (PMCS) for pit operations.	17
56.	Mining method to reduce dilution from flat-lying veins (<30deg. dip), which are less than 5 ft. thick.	41

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60. Production d'un pilier de surface sous 40m de till.	53
61. Design and development of air track drill equipped with high speed valveless pneumatic rock drill.	113
62. Investigating the various methods of loading wet blastholes with non water- resistant ANFO. (Kent MacNeill, Snr. Blasthole Tech.)	42
63. Investigation of the ways to move ANFO horizontally without using-compressed air as a motive force. (Ken Culhane, Planning & Electrical Engr.).	42
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65. Investigate difference in ground disturbance caused by various blasting sequences, as measured by vibration monitor. Kent MacNeill, Snr. Blasthole Tech.)	42
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4.	Complete relocation of Highmont mill complex along 9 km of mine roads using heavy diesel equipment. Major logistics project.	15
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6.	Continuous materials handling systems - Design and feasibility in medium sized hardrock mines.	83
7.	Refinement of placement techniques for paste fills.	43
8.	Collection and compilation of historical data on wire rope examination and testing; pertaining particularly to hoisting equipment.	126
9.	Investigation and study of sulphide ore dust explosions.	126
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11.	Testing methods for mining, drying and conveying high grade fines recovered from sumps.	31
12.	Deep level conveyor hoisting from several loading points fitted with grizzlies and rock breakers.	48
13.	Containerized materials handling.	48
14.	Hydraulic hoisting of minus 3 in. screened ore up 2260 ft. at Onaping Mine (HDRK project).	34

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15. Establishing a central control room at Strathcona for hoists and other materials handling functions. 34

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17. Backfill quality control in underground mining. 104

18. Continuous mobile ore removal system. 36

19. High density fill. 36

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21. Design and evaluation of mine shaft loading pockets - phase 2. 132

22. Logiciel d'affectation en temps réel des camions dans une mine à ciel ouvert. 90

23. Development of a computer program for simulation of pulling or drawing ore from stope drawpoints. 97

24. A semi-automated truck dispatching system. 93

25. Simulation of underground haulage. 93

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28. Elaboration d'un modèle de gestion des stocks de concentré et boulettes au port. 66

29. Research in slurry pipeline technology including coal/crude oil slurry, emulsions and de-watered lignite. 122

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30. Installation of raise elevator in 3930-3510 service raise. 47

31. Measurement of fragmentation 86

32. Installation and commissioning of gyratory crusher and screen plant for production of crushed rock backfill 39

33. Upgrade mine hoisting system to 9000 tpcd by installing 22 tonne skips and altering the hoisting cycle 39

34. Install and commission a high pressure pumping system for the handling of underground slimes (from sumps and settlers) 39

35. Design, install and commission an underground bulk lubricants handling system 39

36. Upgrade and automate a surface cement slurry plant to facilitate one man control 39

37. Spontaneous combustion evaluation and control technologies for coal and coal products during mining, processing, transportation and storage. 120

38. Evaluation d'une mini chargeuse-navette électrique (80 cm de large). 55

39. Étude statistique de la distribution des échantillons de minerai (Au) dans les points de soutirage. 63

40. Determination of optimum fly ash/cement ratio for cemented mine backfill material. 44

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44. Guidelines for underground rail haulage. 76

45. Testing density probe for improving removal of waste from raw coal product during loading operation with continuous surface miner. 26

46. Underground run-of-mine ore conveying system linking four ore passes to the gyratory crusher installation. 103

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48. Causes and alleviation of coal dust problems associated with coaltransportation in low climatic temperatures. 117

49. Design and development of low profile teledump trucks for use in low headings in underground mines. 113

50. Investigation of the ways to move ANFO horizontally without using-compressed air as a motive force. (Ken Culhane, Planning & Electrical Engr.). 42

51. Evaluation of cement alternatives, such as the use of slags in hydraulic backfill materials. Michael Zaiser, Snr. Contract & Research Eng.) 42

52. Investigating the possibility of remote automation of production scram drift slushers. 42

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9. Research on ceramic filters and their use underground to clean diesel exhaust gases.	71
10. Completion of hoist design computer program for drum, friction and Blair hoists.	71
11. Recirculation of mine ventilation air in order to decrease heating costs.	70
12. Prevention of secondary sulphide dust ignitions/explosions.	18

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14. Sound and vibration suppression on compressed air equipment (jacklegs and stopers).	24
15. Testing a non-rotating balance rope with plastic filled valleys.	67
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17. Combined study of radiation, dust and ventilation in underground mines.	125
18. Maintaining a database of information on current and developing mining technology.	127
19. Identification of major sources of radiation and the factors affecting the release of radiation in mines; study of methods to control radiation emanations.	125
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21. Study of automated control of ventilation systems in Ontario mines.	127
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26. Evaluation of computerized survey calculations.	48
27. Establishing a central control room at Strathcona for hoists and other materials handling functions.	34
28. Blast vibration monitoring in blasthole stopes when mining against backfill.	33
29. Vacuum blower unit, designed using rotary vane type blower with a screen conveyor feed.	32
30. Wire rope and hoisting technology. CANMET/Ontario MOL/USBM joint project.	132
31. Evaluation of non-destructive testing device for mine shaft wire ropes. CANMET/Ontario MOL/USBM joint project.	132
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Readers are invited to comment on this document; such comments will be appreciated and will be examined prior to compiling future issues.

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